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AMERICAN GAS LIGHT JOURNAL

VOL. CVI., NO. 26
WHOLE No. 3094

NEW YORK, SATURDAY, JUNE 23, 1917

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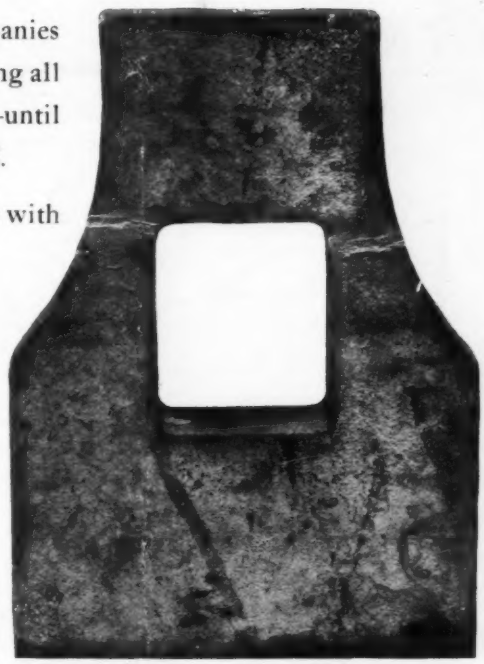

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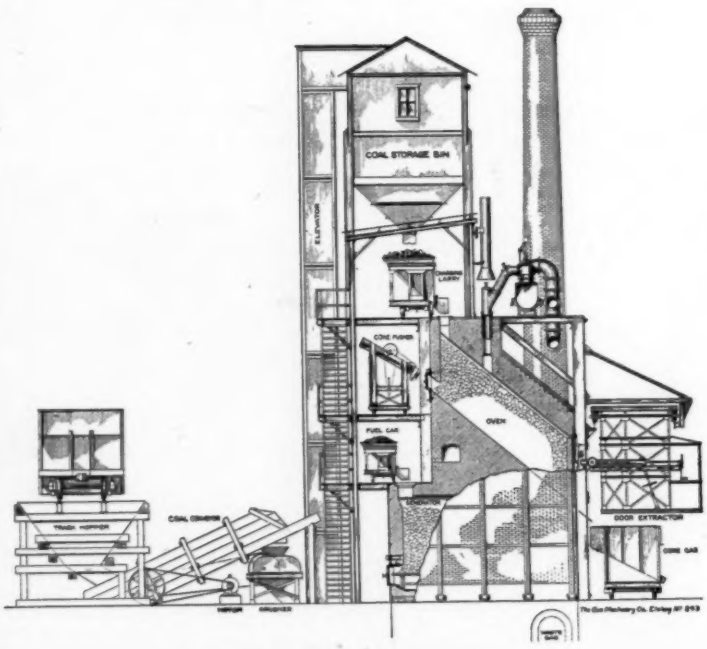

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FORMERLY THE AMERICAN GAS LIGHT JOURNAL

Vol. CVI, No. 26 NEW YORK, JUNE 23, 1917 Whole No. 3094

Wide Diversity of Uses of Gas-Fired Soft Metal Furnaces

Making of Babbitt Metals and White Bronzes, Salvaging Pure Metal from Dross, Tin Coating, Die Casting, Soldering, Etc., Discussed—War Makes Subject of Especial Interest

By GILBERT C. SHADWELL

There are so many other soft metal operations that it would be difficult to deal with all of them, but a general outline will be given of the more important operations involved so as to give an idea of what business may be expected.

The subject of soft metal melting as applied more particularly to the printers' and allied trades was dealt with in a previous article by the author in the AMERICAN GAS ENGINEERING JOURNAL, but its broader field was scarcely touched on.

In that article the melting of linotype metal, including the remelting of linotype slugs, and the melting of stereotype metal and electrotype metal, were considered.

Among the important soft metals are the general class of Babbitt metals. These embrace alloys of copper, tin and zinc with the addition of lead and antimony in some cases. The Babbitt metals (named after Babbitt, the inventor) are used largely for the bearings of engines and machinery generally. Some idea of their variety will be seen in the following table.

	Proportions of					
	Copper	Zinc	Bismuth	Tin	Antimony	Lead
Bearings for locomotives	2	...	..	90	8	..
" " "	8	...	..	75	17	..
Bearing metal (universal)	2.5	...	1	..	16.5	80
Lining metal	..	...	..	42	12	46
Navy Babbitt alloy	8	...	..	83	9	..
Commercial Babbitt	1.8	33.35	..	64.7	..	1

There are scores of similar Babbitts, but the above will serve as an example of their diversity. All of such work may readily be carried out in a soft metal furnace such as was described and illustrated in the previous article.

Originally, the inventor, Babbitt, considered Babbitt metal as being of a fixed composition, namely, 90 per cent tin and 10 per cent antimony and copper, but now almost any bearing metal is deemed to be a Babbitt.

Babbitts should not be confused with bronzes, however, as although soft metals having a melting point of 600-900 deg. Fahr. may be melted in a soft metal furnace, some bronzes cannot readily be handled in such furnaces. Such bronzes are those having a preponderance of copper such as the following:

Description	Proportions of Copper	Zinc	Tin	Antimony	Lead
Metal for frictional parts of locomotives (extremely hard)	87	5	8	..	..
Bearings of Carriages	97	3	..	..	..
Bearings of driving wheels, also for steam engine whistles giving a clear sound	80	2	18	..	..
Steam engine whistles giving a deep sound	81	2	17	..	..
Cross heads of connecting rods	82	2	16	..	..
Bearings of axles and trunnions, etc.	84	2	14	..	..
	85	2	13	..	..
	84	7	9	..	..
	68	4	28	..	..
Axle boxes	88	2	10	..	..
Mathematical instruments	90	2	8	..	..
Machinery bearings, etc.	67	.	14	..	19
Anti friction metal (Stephenson)	79	5	8	..	8
Imitation silver	64	.	3	..	..
Pin wire	67	33	0.5	..	0.5
Bearing and valve metal	83.25	.	7	..	9*

* Also 0.75 phosphorus.

Such alloys are usually melted in a crucible furnace, but white bronzes (having a smaller proportion of copper than zinc, tin, etc.) are melted in a soft metal furnace. In these cases the zinc, tin, etc., are first melted and the copper added afterwards. The copper is then rapidly "absorbed" by the other metals.

We may then classify the soft metals generally as follows:

STEREOTYPE, LINOTYPE AND ELECTROTYPE METALS

Soft metals which may be melted in a soft metal furnace with atmospheric burners See previous article.	Composition* Sn.	Cu.	Sb.	Zn.	Pb.	Bi.	Al.	Industries to which these are applicable
Britannia Metals	85.7	1	10.1	2.9	..	..	..	Manufacturers of hollow ware, fancy lamps, statuary, etc., table ware, coffee pots, etc., etc.
	81.9	..	16.2	1.9	..	..	..	
	81	2	16	1	..	..	..	
	70.5	4	25.5	...	..	..	..	
	22	10	62	6	..	..	..	
Babbitt metal for light duty	89	31	88.9	...	..	..	..	Machine shops, railroad shops, Babbitt metal manufacturers, machine manufacturers.
Harder Babbitt for bearings "Babbitt"	45	51.5	13	...	40	..	..	
Plate Pewter	89.3	1.8	7.1	...	..	1.8	..	Pewter ware manufacturers, saloon equipment manufacturers, etc.
White metal	85	5	10	...	..	..	..	Machine shops; railroad shops; Babbitt metal mfrs.; machine mfrs.; badge mfrs.; die casting mfrs.; candle stick mfrs.; white metal casting foundries; smelters for making lead products, etc.
Die casting metals	5	10	....	83	..	..	2	Die casting plants.
	1	6	....	90	..	..	3	
	5	5	5	85	..	..	..	
	10	3	....	87	..	..	..	
	....	8	....	92	..	..	..	
	8	4	....	85	..	..	3	
	15	5	....	74	..	..	6	
	19	5	....	73	2	..	1	
	12	11	....	74	..	..	3	
	31	20	....	46	..	..	3	
	3.5	2	1.5	93	..	..	..	
	4	1	15	...	80	..	..	
	....	3	....	17	..	..	80	
Zinc	....	..	....	1	..	..	..	Galvanizing plants.
Solders:								
Common	1	..	....	...	1	..	..	Plumbers (large)
**Zinc	2	..	....	...	1	..	..	Mixed metal manufacturers.
Cheap	1	..	....	...	2	..	..	
White bronze	7.6	2.3	3.8	83.3	3	..	..	Machine shops; railroad shops; Babbitt metal and brazing metal manufacturers; machine manufacturers.
Anti-friction bronze	88.8	3.7	7.5	...	..	..	..	
Tin and tinning	1	..	....	...	..	..	..	Mfrs. of ornaments and all tinned ware; tinfoil mfrs.; collapsible tube mfrs., etc.
Lead	....	..	....	...	1	..	..	Toy mfrs.; mfgrs. of weights, tinkers' seals shot; bullets; bottle caps, etc.

Note: * Sn = Tin; Cu. = Copper; Sb. = Antimony; Zn = Zinc; Pb. = Lead; Bi. = Bismuth; Al. = Aluminum.
** This is the hardest solder. It is the eutectic alloy or the one with the lowest melting point.

Metals, etc., which may be melted in a soft metal furnace with fan or positive blast burners	Al.	Cu.	Sn.	Sb.	Zn.	Pb.	Bi.	Industries to which these are applicable
Aluminum	1	..	..	..	..	..	..	Aluminum casting mfrs.; die casting mfrs.; mfrs. of artificial limbs, teeth, etc.
Aluminum—white metal alloys	(See die casting metals in previous table—blast being desirable)							Same as above
Zinc	..	..	..	..	1	..	..	Galvanizing zinc shaving mfrs. (gold refining) moulds, etc.
Spelter	..	1	..	..	1	..	..	Ladies' hat blocks, moulds, etc. Railroad shops

In addition to the above, soft metal furnaces are used for such purposes as melting saltpetre for coloring steel, the steel being dipped in the bath for blueing it.

Dross Melting Furnaces

Chemical houses also employ these furnaces for certain operations; they also have a large field for use in lead hardening as well as lead tempering.

Among the uses of special soft metal furnaces the dross melting furnace must not be forgotten. A type of such a furnace with its hood is shown in Fig. 1. The dross to be treated is heated and from it the clear

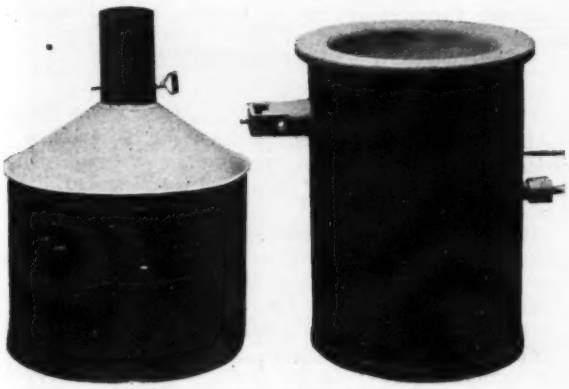


FIG. 1. BRASS MELTING FURNACE SHOWING HOOD

metal is run off from the side outlet. This is used by dealers in printers' metals and others for recovering what would otherwise be discarded as a waste product.

In the tables given the matter of tinning has been referred to.

This is an operation which is carried out in a host

FIG. 2. ATMOSPHERIC SOFT METAL FURNACE

of factories for coating articles with tin. This may be done for many reasons; for instance, the tinning may be used as a metal coating for protecting the article tinned or it may be carried out as a preliminary operation previous to soldering or previous to providing a further covering of Babbitt, etc.

An example of ordinary tinning is seen in the case of tinned copper articles for instance, tinned lids, tinned cauldron furnace kettles, etc. Ordinary tinning is often carried out in an atmospheric soft metal furnace such as is shown in Fig. 2.

In the case of tinning bearings to be Babbitted, however, a furnace such as is shown in Fig 3 is to be recommended. In this case the part is first dipped in a "flux" and then placed on the ledge to dry after which it is dipped in the bath and tinned. Surplus tin can be easily removed by knocking the part on the ledge.

Among the other operations mentioned in connection with soft metal melting is that of die-casting. Die-casting metal may also be melted in a regular atmospheric furnace if it contains no aluminum or at least only a small proportion. Often a special furnace is desired for this work. Such a furnace is shown in Fig. 4. In this particular case the furnace was equipped with both artificial and natural gas burners so that in case the natural gas failed, the artificial gas could be instantly turned on and used as a substitute. The capacity of the burners was made the same in both cases.

A Comparatively Recent Method of Producing Castings

Die casting is a comparatively recent method for producing castings which do not have to be machined. As a rule the work is carried out with metals having comparatively low melting points, soft brass being about the highest. The process consists of forcing the molten metal into steel dies, allowing it to cool in them and then opening the dies and removing the casting. The casting will be found to be entirely finished.

The advantage of the process cannot be over-estimated. As the dies are costly to make, however, the process is only to be recommended when large quantities of the goods are required. Great care is needed in carrying out the work.

The processes of soldering are so closely allied to soft metal melting that reference should be made to them.

Soldering is merely another name for joining together two pieces of metal by means of a third fusible metal. The operation can only be carried out if the surfaces of the parts to be joined are kept clean and unoxidized. This cleaning is maintained by means of what is termed a flux and this flux is often different for various kinds of work as will be seen later.

If, let us say, brass or copper are soft soldered the parts are cleaned, dipped in flux and then molten solder is applied. The solder unites with the copper or brass actually dissolving a small quantity into itself and thus

FIG. 3. FURNACE USED IN TINNING BEARINGS WHICH ARE TO BE BABBITTED

FIG. 4. FURNACE FOR DIE-CASTING METAL EQUIPPED WITH BOTH ARTIFICIAL AND NATURAL GAS BURNERS

the resulting juncture consists not of solder only, but of a solder and copper or brass alloy. The process is therefore not quite the same as when wood is glued together because wood is not dissolved in the glue, whereas metal parts are dissolved in the solder to some extent. In order to make a soldered joint more stable, tinning is often resorted to as a first step in the process.

So far as fluxes are concerned they vary for different metals as will be seen in the following table:

Metal to be soldered	*Flux to be used*
Brass or Copper	Zinc chloride, salammoniac or borax.
Zinc	Zinc chloride or hydrochloric acid.
Lead or tin	Zinc chloride or rosin.
Pewter	Olive oil or tallow.
Galvanized or black sheet iron	Zinc chloride or rosin or both.

The composition of one or two solders has already been given but the following are also in common use for soft soldering:

Composition of soft solder		Approximate melting point
Tin	Lead	Bismuth (Degrees Temp. Fahr.)
1	1	370
3	4	2 340
1.5	1	335
4	4	1 320
3	3	1 310
2	2	1 290
1	2	2 235
5	3	3 200

In carrying out ordinary soldering the solder is melted by means of a copper and applied to the part to be soldered. For small irons an atmospheric furnace is employed such as that shown in Fig. 5, but for large capping irons a modification is necessary and a furnace of the kind shown in Fig. 6, must be employed. The atmospheric furnaces are well known to most readers and hardly require any further explanation, but as blast soldering furnaces are not so familiar a word regarding them may not be out of place.

Heating Large Soldering Coppers

This type of furnace is designed for heating large soldering coppers, such as "hatchet" and "capping" irons. For this, and similar work, it has no equal. The largest coppers are heated in a quick and efficient manner.

The burner is designed on the same principle as the usual blast burner. Such a furnace should be made to operate with fan or positive air pressure. The flame should not blow away under a wide range of adjustment. It is very desirable that the burner should be placed at the top of the furnace as in this way it cannot become clogged with dirt from the irons. It should be easily accessible for cleaning, should this ever become necessary.

The heat should be capable of being easily regulated. This can be accomplished by arranging for the air and gas lines to have valves instead of cocks, which allow of a very wide range of control.

These valves should be placed under a shelf in the front, such a shelf will protect them from becoming heated and at the same time will provide a convenient rest for the handles of the irons, or for any other work.

This kind of furnace being virtually a small forge has found wide favor in a large number of places for the heat treatment of small steel pieces, such as cutting tools, dies, punches, etc. It is a very useful appliance in the machine, automobile and repair shop.

Soldering by means of hatchet irons is sometimes adopted for soldering long straight seams such as on large cans.

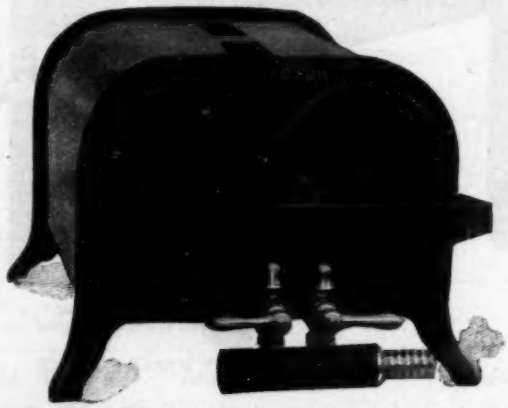


FIG. 5. ATMOSPHERIC FURNACE FOR SMALL SOLDERING IRONS

Soldering is also carried out by melting the solder in a small furnace and then dipping the fluxed parts.

A brazing burner (a series of which are shown in Fig. 8) is often used when the hard solders are employed. In this case powdered solder is often used. This is also often done in soldering bulky or irregular shaped parts.

Cast iron is usually soldered by coating the parts with acid copper sulphate solution after which the parts are brushed, and tinned after which it may be dipped, but the process is by no means an easy one and is not always satisfactorily accomplished.

Brazing burners are needed for soldering silver and gold, special solders being needed.

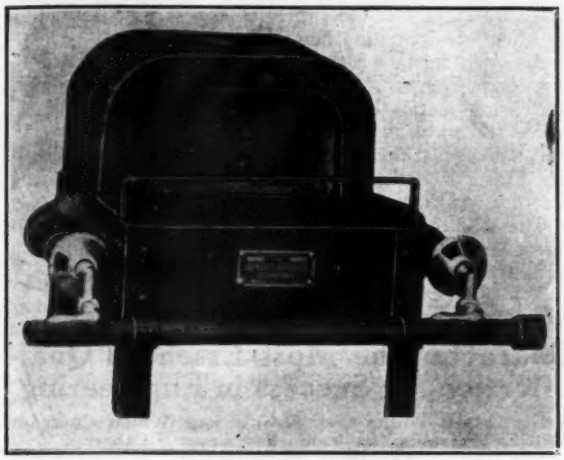


FIG. 6. FURNACE FOR LARGE CAPPING IRONS

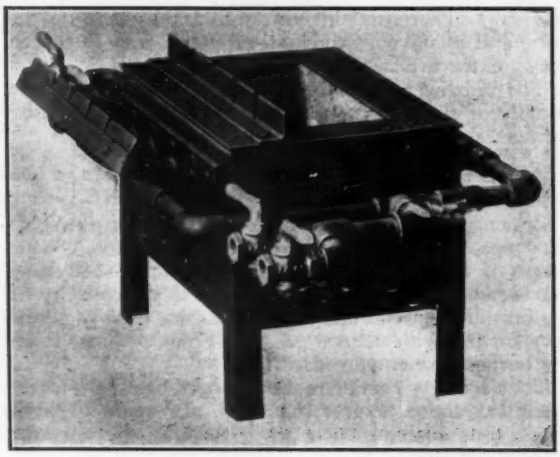


FIG. 7. ATMOSPHERIC BLAST SOLDERING FURNACE

Hard Soldering and Brazing Closely Allied

Hard soldering has been referred to above but no very definite definition was given to this work.

Hard soldering and brazing are closely allied. Brazing is generally understood to mean the joining of metals by a film of brass, whereas hard soldering usually means that "silver" solder is used as the joining medium in the case of jewelry work and that a solder having a relatively high melting point is used in other work of this nature.

FIG. 8. VARIOUS SIZE BRAZING BURNERS

For hard soldering or brazing a red heat is required, borax being the flux usually employed.

The heat is usually derived from a brazing burner or blow torch (as shown in Fig. 8) or from a brazing table (Fig. 9) or brazing Forge (Fig. 10). Further reference will be made to these appliances in a later article.

Brazing, then, is practically identical with hard soldering except that brass (sometimes called "brazing spelter") is substituted for solder. The fact that greater heat is required is an advantage of brazed over soldered work, as it will withstand more heat without breaking or weakening.

Before brazing, the edges of the parts must be thoroughly cleaned in dilute sulphuric acid or other suitable material.

It is often necessary to rivet or bind the parts together before brazing, but with a good brazing table with most solders this will be seen to be unnecessary.

The distinctive feature of the brazing table shown is that it is made with such work holders.

These work holders are most efficient. They may be used to hold the work in a convenient position for brazing or heating or in keeping together the parts which are to be brazed, thus often making it unnecessary to rivet the pieces before brazing. The mechanic may thus have both hands free—a matter which is highly essential in many operations. This also enables the parts to be turned around without affecting their juncture.

The method by which the work and the burners are supported deserves attention. Two vertical supports are provided at the rear of the table and the burners and work holders are secured to these supports by universal clamps. The position of both the work and burner-clamps may thus be adjusted on the supports, any desired position in a vertical or a horizontal direction being obtained. The clamps may also be set at any angle by adjusting the clamp brackets.

It is very desirable that the table top should have a removable center-piece and front section as features of this kind greatly facilitate the handling of intricate shapes. Such work may be lowered through this opening.

The table top should preferably consist of a heavy casting thoroughly reinforced on all sides to prevent

FIG. 9. BRAZING TABLE

warping. There should be a substantial shelf on the bottom at a convenient height, on which may be placed tongs, extra fire-brick, etc.

The brazing burners in use with a brazing table are usually of similar construction to the standing brazing burners above mentioned.

Burners Usually Made of Wrought-Iron Pipe

Brazing burners are usually constructed of wrought-iron pipe, with brass cocks. They should have a wide range of adjustment, so that a sharp or a soft flame may be obtained of any intensity, up to the capacity of the burner. Special brazing burners are usually necessary for use with natural gas. At times all-brass brazing burners are employed.

They are very similar to the standard brazing burners described above, except that they are made of light brass, thus enabling them to be held by the operator without fatigue.

Connection is made to the table by means of rubber hose which should be armored to prevent kinking. The length of the hose should be sufficient to enable the operator to place the burners at any angle or in any position.

Has Wider Range of Usefulness Than Any Other Heating Appliance

A brazing table finds a wider range of usefulness in the shop than any other heating appliance.

A forge or a furnace of any shape may readily be made by the aid of the fire-brick for forging jobs, tool dressing, straightening bent axles, etc., etc.

An oven furnace may similarly be made for hardening, tempering, etc.

Bearing metals can be melted off bearings and allowed to run on to the top of the table.

It has a great diversity of minor uses, such as annealing brass, sweating solder, heating rivets, preheating for oxy-welding, etc.

The war makes this subject one of very special interest and gas companies will find themselves called on to assist in a large amount of this work.

FIG. 10. SHOWING A BRAZING FORGE IN OPERATION

Character the Most Essential Qualification for Success in Engineering

W. A. Cattell Points Out Temptations Which Confront Profession in Valuation Cases — Other Qualifications Necessary

The most essential qualification for success in engineering, as in any other profession, is character, declared W. A. Cattell, consulting engineer, of San Francisco, in an address delivered at Stanford University. Honesty, integrity, and singleness of purpose are conceded universally to be the foundation upon which real and permanent success in any calling must be based.

The engineer, however, is subject to some peculiar and insidious temptations, and if he is to be really successful must develop a strength of character and a quality of honesty not always so important in other professions.

For instance, it is considered quite permissible for the lawyer to espouse the cause of a client and endeavor to win for him an advantage at the expense of his client's opponent, the very nature of his employment frequently demands that he should do so, but this the engineer cannot do.

He must, of course, conserve the interests of his clients and endeavor to secure for them the greatest efficiency of performance and the highest possible earning power for the capital that they invest under his direction, but he must cultivate a strictly judicial attitude and he must have the courage of his convictions in dealing with his clients.

He must point out to them clearly what is essentially for their best interests, even though it may result in diminished fees, or possibly the loss of some profitable engagement.

It sometimes happens that projects that ultimately result in failure are undertaken because the engineer did not have the courage to tell his clients what the entire cost would be, for fear of their abandoning the project altogether.

Dealings With Contractors

In dealing with contractors it is not permissible for the engineer to seek to save money for his clients at the contractor's expense. It is his duty to see that the contractor does his work honestly and thoroughly, but it is also his duty to see that the contractor is justly treated and properly compensated. In disputes between client and contractor it is the province of the engineer to act as arbitrator rather than advocate.

The engineer must therefore develop a high degree of intellectual honesty. It is not sufficient for him to be honest in the handling of money, but he must also be honest with himself, with his clients, with contractors,

and with the public. To do this he must have a clear perception of the ultimate effect of his every act and recommendation.

The engineer, too, must guard against the temptation to the more subtle forms of dishonesty to which men in many other professions are also peculiarly subjected. Many a young engineer who thought himself strictly honest in all his dealings, and who would indignantly reject any offer of compensation for dereliction, has allowed himself to be swerved from the path of rectitude, or at least influenced in his decisions, by the prospect of more remunerative employment or social preferment, with which unscrupulous contractors have sought to bribe him. In the course of litigation in which the engineer frequently finds himself either a willing or an unwilling expert witness, he must be careful that in the heat of controversy, or under the stress of a gruelling cross-examination by an opposing attorney, he does not exaggerate conditions or misstate facts. The temptation to do this is often strong.

Valuation Testimony

The giving of testimony before courts and commissions as to the cost or value of public utility properties has, within the past few years, furnished a considerable amount of employment for engineers, particularly in California. In such cases the engineer must be careful not to allow himself to take the place of the lawyer and become a special advocate for his client, or to make a higher or lower valuation than his best judgment indicates to him to be correct, in the belief that the engineers employed by the opposing side will make a valuation, high or low, in the opposite direction, and that the findings of the court or commission will be a compromise between the two, resulting in substantial justice to his clients.

The second essential qualification for success in engineering is industry. Here again, you may say you know that a man must work hard to succeed in any profession. This is true, but I believe the engineer must work harder than the lawyer, the doctor, or the architect in order to win corresponding professional success.

A distinguished lawyer in San Francisco said to me, after several years of intimate association with the late Arthur L. Adams in a long lawsuit involving an enormous amount of engineering detail, "I used to think that lawyers were the hardest working men in professional circles, but now I take my hat off to the engineers."

Necessity of Extensive and Continual Reading to Keep Abreast of the Times

Lawyers, doctors, architects and engineers all have a great amount of work to do to keep up with the new things of their professions, but this is particularly true of engineering, which in many of its important features is changing more rapidly than any other profession. New materials, processes, and devices are continually being added to the general equipment that the engineer must use to get the most economical results, and he must therefore spend a large amount of time in reading and studying, outside of the time employed on the special work that he may have in hand, which in itself is generally most exacting. Sound engineering plans are not produced by inspiration, but by hard work; they are evolved by carefully working out every detail and coordinating each into a comprehensive and complete plan of development.

Many other qualities are desirable for success in engineering; courage, tact, and diplomacy, and the ability to make and keep friends are most essential. In fact, the success of the consulting engineer in private practice is often as much dependent upon his circle of friends and acquaintances as upon his technical knowledge or executive ability.

One of the most important qualifications for success in engineering is the ability to write and speak English correctly and forcefully. Many a good project has been turned down by interested capitalists because the engineer's report was so poorly written that it failed either to hold their attention during its perusal or to carry conviction at the end; while others of comparatively little merit have been taken up because they were presented in clear and convincing English.

Clear Writing and Forceful Speaking the Result of Clear Thinking

There are many occasions, too, when the ability to speak in public or before a board of directors is most important for the engineer. This ability is a natural gift with few, but it can be cultivated. In the past engineers have been prone to neglect the cultivation of this ability in the belief that it was of relatively small importance to them as compared with its importance to the lawyer or the clergyman, and that engineering required action rather than fluent speech. This, to my mind, is a mistake, and I believe that one of the most important things that the engineer can do in college, outside of the course of study prescribed, is to acquire the ability of expressing himself clearly in writing or on his feet before an audience.

Clear writing and forceful speaking are the result of clear thinking; they are the expressions of the essence of the man's mentality. One may have a vast amount of accurate detail knowledge of engineering matters, but unless he can produce this knowledge rapidly and in logical sequence it is frequently of little value to him. I have often thought that our technical colleges might be of great help to young men in this respect by giving them some special training in the art of clear thinking, teaching them how to direct their minds along a given course of thought in such a way as to enable them to obtain accurate and comprehensive results with the least amount of effort.

Planning the Work Beforehand

One of the first things that an experienced engineer does when a large engineering project is presented to him, is to consider rapidly the various steps he will take to produce the final result, what assistants he will employ, what surveys he will make, what data he must collect and how he will obtain them, how he will analyze and arrange them, what plant machinery or structures will be required, what studies and investigations he will make, how he will present his report, how, if he is authorized to do so, he will proceed with its construction, what methods he will employ, how long each step in the process will take, how the whole will appear, and just what its functions or uses will be when completed. He outlines the whole process in his mind, and his ability to do this quickly, clearly,

and logically will be of great assistance to him in his future work.

While this ability can be perfected only by experience, I believe engineering students might be materially helped by giving them some definite and systematic training along these lines in addition to instruction in fundamentals and good practice. Even without assistance from those more experienced, the engineering student can train himself in this matter of clear and logical thinking.

Exercising the Imagination

This leads me to point out another quality of mind which I think the engineer should cultivate, and that is imagination; not the habit of imagining things that are fantastic or visionary, but the ability of conceiving in his mind quickly and accurately those things which, later on, his skill is to fashion into tangible realities.

There are two moments in connection with any important piece of work which stand out prominently in the experience of every engineer. The first is when his trained imagination has mentally visualized the thing to be done; when he can see in his mind his road threading its way across plains, climbing mountain sides, crossing rivers, uniting distant towns and cities, carrying passengers with safety and dispatch, and bearing the commerce of a nation; when he can see his bridge spanning the mighty river, or the mountain torrent harnessed and supplying light and power to homes and industries or, again, conducted to cities of large population to promote health and cleanliness. The second is when he sees such a creation of his imagination stand before him an actual and tangible reality, complete in all its details. Between the two there is much hard work and many trials and discouragements but in the end there is ample compensation.

Points Out Advantages of Cracking Petroleum in the Liquid Phase

Ray Cross Includes Among Them Superior Product, Higher Yield of Refined Gasoline, Its Automatic Removal from Sphere of Action as Fast as Formed, High Economy of Heat, Etc.

In the study of the temperature-pressure decomposition relations of the hydrocarbons composing petroleum, it is necessary to confine all substances in a closed vessel with the vapor in equilibrium with the liquid in order to observe the conditions under which transformations take place.

In the application of heat to such a system it is most convenient to apply this heat to the liquid phase. In so doing, the temperature of the oil and the pressure developed are correct indices of the vaporizations and transformations within the system.

Rate of Development of Pressure

The amount of pressure developed up to a certain point is directly proportional to the temperature. At this certain point, however, the pressure is no longer proportional to the temperature, but increases at a much greater rate than the increase of temperature and the pressure under certain conditions even continues to rise with no increase in temperature and with an actual fall of temperature.

The rate of development of pressure depends upon the actual temperature of the confined oil, and also depends upon the character of the oil under treatment.

The certain temperature at which the disproportionate rise of pressure takes place is not absolutely definite, as it seems to be much lower when the rate of heating is low and much faster with a high rate of heating or a high temperature of oil.

In fact, if the temperature of the oil is carried to 400 deg. C. or above, the decomposition will take place with almost explosive violence even without further application of heat.

This kind of decomposition is undesirable on account of the excessive production of non-condensible gas, though this gas is largely of the paraffin series of hydrocarbons, declared Ray Cross in his paper on the "Cracking of Petroleum in the Liquid Phase," presented at the Kansas City meeting of the American Chemical Society.

Furthermore, there is not so satisfactory a yield of the gasoline hydrocarbons.

With a slow rate of heating, there is a distinct decomposition at 300 deg. C., and there is possibly some cracking below this temperature.

With a hot flame applied to the container, the residual heat after removing the fire has some effect, but it has been observed that there is additional development of pressure even after the container itself has cooled below the temperature of the oil.

Desirability of Lower Cracking Temperature

There seems to be little doubt that a temperature of cracking below 400 deg. C. is necessary for a first-class product, and that the lowest temperature possible is to be used.

It would be highly desirable to find a catalytic agent which would sufficiently accelerate the conversion at 300 deg. C. or lower to make such a temperature commercially usable. This would greatly lower the pressure needed, as gasoline at 400 deg. has a vapor pressure of over 50 atmospheres while at 250 deg. its vapor pressure is below 30 atmospheres.

A considerable amount of the pressure developed in a closed system is due to the non-condensible gas as is evidenced by the fact that in a typical conversion 8 atmospheres of pressure remained when the container was cold and when it was originally half filled with mid-continent residuum of 26 deg. Baumé gravity. In the same conversion 40 per cent of 58 deg. Baumé gravity gasoline was produced based upon the treated oil.

In cases where the pressure developed with excessive rapidity there was slightly less gasoline and more permanent gas.

A very good measure of the quality of gasoline produced is the ratio of the specific gravity to the boiling temperature. A very low ratio is an indication of gasoline of high hydrogen content, of good quality and of low refining loss.

Gasoline made by confining the heavy hydrocarbons at a temperature of 380 deg. C. gives gasoline having as good a ratio of gravity to boiling point as natural gasoline. Olefines have a slightly higher ratio than paraffin hydrocarbons, and naphthenes and aromatics have a much higher ratio.

Gas oil cracked in the vapor phase without pressure in muffles at a temperature of 600 deg. C. gives naphtha composed largely of olefines and aromatic compounds

and with a large amount of permanent gas of the illuminant type.

Advantages Enumerated

Based upon laboratory experiments on cracking petroleum, both in the liquid phase and in the vapor phase, and based upon commercial size tests in the liquid phase at low temperature and the vapor phase at 600 deg. C., the following advantages seem to be shown in the application of the heat to the liquid phase:

(1) A product of superior quality is obtained.
(2) A higher yield of refined gasoline is to be had.
(3) There is a selective action on the oil or heavy portion of the petroleum with freedom from further cracking of the portion in the vapor phase.
(4) There is automatic removal of the gasoline from the sphere of action as fast as it is formed.
(5) There is high economy of heat.
(6) There is deposition of the carbon in the suspended condition in the oil and not on the walls of the heating tubes.
(7) There is high oil capacity with small dimensions of plant.
(8) There is perfect control of temperature.
(9) There is rapid and complete absorption of heat from the furnace.
(10) There is possibility of operating either intermittently or continuously.

Disadvantage of Cracking in Liquid Phase

The disadvantage in cracking the oil in the liquid phase is the high pressure required for maintenance of equilibrium and the attendant danger of failure of apparatus.

The disadvantage of cracking heavy petroleum in the vapor phase are:

(1) The poor quality of the product.
(2) The overproduction of permanent gas due to non-selective action.
(3) The deposition of carbon on the walls of the heating tubes.
(4) The comparatively low yield of refined gasoline.
(5) The high temperature required to get capacity on account of the necessity for quick reaction.
(6) The danger of local overheating on account of the low specific heat of the vapor.
(7) The large heating area and plant dimensions for any great capacity.

The advantage of cracking by heating the vapor is that in the absence of pressure there is less danger of destruction of apparatus with explosive violence.

In consideration of the temperatures at which cracking of oil takes place and in consideration of the vapor pressure developed by gasoline and other light hydrocarbons at the temperature of cracking, it appears that the optimism method of operation for converting heavy oil to gasoline in the vapor phase is to maintain a pressure of 30 atmospheres or 450 lb. per square inch and a temperature of not over 400 deg. C. If it were possible to lower the temperature for rapid conversion by means of a catalytic agent, then, of course, the pressure necessary for operation would be considerably lowered. In practice, heating would be done in a tube furnace with rapid circulation of oil from and to a vapor chamber which also serves as a chamber for the separation of carbon.

Publications

National Commercial Gas Association Proceedings 1916

Cloth-bound volume; 9 x 6 in.; 667 pages illustrated. Issued by National Commercial Gas Association, Louis Stotz, secretary, 61 Broadway, New York City.

Contains account of the annual convention at Atlantic City, Nov. 13 to 18, 1916, names of officers, membership list, committee memberships and list of exhibitors. The following papers are published: "A Plea for Quality Merchandise," composite paper by Manufacturers' Section; "Industrial Fuel Gas" by Henry O. Loebell; "Experiences in the Industrial Fuel Field" by W. A. Ehlers; "The Correct Utilization of Heat" by L. J. Platt; "Hotel, Restaurant, Institution and Club Gas Appliance Installations" by G. M. Karshner; "Placing and Holding Gas Appliances in Hotels and Institutions" by R. McKean Barry; "Residence Burner Maintenance" by H. S. Christman; "The Graphic Presentation of Gas Company Statistics" by Stanley C. Tarrant; "Adequate Piping of Buildings" by W. T. Rasch; "Combination Gas and Electric Lighting of Residences" by J. P. Zingg; "Replacing Old Types with Modern Fixtures" by Samuel Snyder; and "Office Accounting as it Affects Merchandising" by W. H. Pettes.

Volatile Products of the Carbonization of Coal

Technical Paper 140. Issued by the U. S. Bureau of Mines, Washington, D. C. Authors Guy B. Taylor and Horace C. Porter.

This paper has a particularly timely interest to the gas industry, as the authors suggest that as a result of their study the utilization of inferior coals in the making of gas may be found practicable.

They say that the results suggest the possibility that low temperature carbonization might be utilized in gas manufacture as an enriching process by passing through the low-temperature retorts a relatively large quantity of a thin gas, such as "blue-water gas," sweeping out the light oil vapors that are primarily liberated at these low temperatures.

The report is a continuation of the work described in Bureau of Mines Bulletin 1 on the character of the volatile matter of coal. The experimental methods have been refined and more precise results obtained.

The subject of carbonization is important in all industrial applications of coal, whether it be in gas manufacture or coke making, where it is paramount, or in those processes where coal is burned, such as in boiler furnaces, gas producers, and metallurgical furnaces. The results presented here are more or less of a fundamental character—a study of basic phenomena in carbonization, rather than of the ultimate results of these phenomena as a whole.

The authors, in their general conclusions, say: "A high-grade bituminous coal of the gas-making type decomposes by heat primarily into paraffin hydrocarbons

and a completely altered nonvolatile residue, with small quantities of water, CO_2, and CO. The three latter products are the first produced, although in small quantity; from some other types of bituminous coal they are produced in greater relative quantities than from the gas-coal type. Complex and varied secondary reactions induced by superheating the hydrocarbons, water vapor, and CO_2 are of greater importance in industrial high-temperature carbonization.

"The products of low-temperature carbonization from coal of the Pittsburgh type on an industrial scale at about 800 to 900 deg. Fahr. (427 deg. to 482 deg. C.) will consist of a rich gas amounting to 0.6 to 0.7 cu. ft. per pound of coal, and a large yield of oil, or tar, comprising 10 to 12 per cent of the coal. This tar consists chiefly of paraffin hydrocarbons, is very low or possibly entirely devoid of benzene and naphthalene derivatives and practically devoid of free carbon. The gas will contain 6 to 7 per cent of unsaturated hydrocarbons and 20 to 25 per cent of ethane and its higher homologues, and consequently will have a high calorific and illuminating value. The tar may be either redistilled or subjected to cracking processes so as to produce light oils—gasoline substitutes—whose yield will be greater than, and probably at least double, that obtained by high-temperature carbonization."

Motor Gasoline Properties — Laboratory Methods of Testing and Practical Specifications

Author, E. W. Dean. Technical Paper 166 of the U. S. Bureau of Mines. Published by U. S. Bureau of Mines, Washington, D. C.

Contents include discussion of immediate need of gasoline specifications, types of gasoline marketed and their general properties, properties of gasoline and methods of testing and a review of the gasoline situation.

Occurrence and Mitigation of Injurious Dust in Steel Works

Author, J. A. Watkins, passed assistant surgeon, U. S. Public Health Service. Technical Paper 153 issued by the U. S. Bureau of Mines, Washington, D. C., in co-operation with the Bureau of Public Health Service.

A discussion of industrial dust, particularly as applied to steel mills. Describes methods used in determining amount of dust in the air and apparatus used. Includes comment on various dusts collected and gives information as to their effect upon the human being. Gives general methods of mitigating dust hazard and suggests means of abatement as applied to the steel industry.

Though not directly addressed to the gas industry the paper has sufficient of informative value pertinent to it as to warrant reading by gas works superintendents.

Magnetic and Other Properties of Iron-Aluminum Alloys Melted in Vacuo

Authors, Trygve D. Yensen and Walter A. Gatward. University of Illinois, Engineering Experiment Station, Bulletin 95. Published by the University of Illinois. Urbana. Price Seventy cents.

Records the results of experiments to determine the magnetic and allied properties of iron-aluminum alloys melted in vacuo. Describes material, apparatus and methods employed and the chemical analysis. Gives the results and includes summarization and conclusions. The appendix contains a discussion of magnetic testing with Burrow's permeameter, magnetic and electrical properties and a paper on the determination of aluminum in iron by J. M. Lindgren.

St. Louis County Gas Company Offers First Mortgage Bonds to Employees

A very comprehensive leaflet has been issued by the St. Louis County Gas Company, explaining the advantage to the customers, employees and friends of the company, of the purchase of first mortgage 5 per cent gold bonds.

These bonds are in denominations of $100 and $1,000, bearing interest at 5 per cent per annum, and payable either at the option of the purchaser in cash, or installment payments as explained in the leaflet.

Ten good, sound reasons are given for buying the bonds and the backing of the company is also explained.

Indiana Association Petitions for Lower Heat Standard

Asking that the public service commission make an order reducing the heat standard for artificial gas in their state from 600 British thermal units to 550, the Indiana Gas Association, representing all of the gas companies in the state of Indiana has filed a petition with the commission.

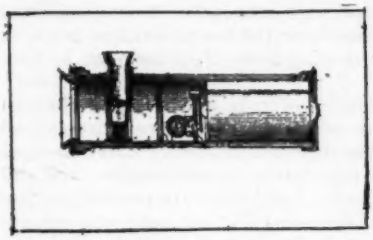
S. E. Mulholland, C. H. Chubb and J. D. Forrest are the members of the committee that filed the petition for the organization. The plea covers the twenty-nine artificial gas companies operating in Indiana towns and cities.

It is set forth that on account of the scarcity of gas-making materials, it is practically impossible for Indiana companies to produce gas which will come up to the heat unit standard of 600 British thermal units, "even in those cases where this standard has been reasonably well maintained in the past, and regardless of the exceptional high cost of such materials."

In its petition, the Indiana Gas Association also declares that it is not possible to produce gas having an average heat value of 600 B.t.u. except by imperfect and wasteful carbonization of coal; that it is necessary to conserve the coal supply in the most efficient manner possible; that if coal is perfectly carbonized this can only be done by the wasteful use of benzol or other valuable and expensive enriching oils, which are exceedingly scarce and that the federal government may forbid such use of these important oils.

The petition also asks that the minimum period for testing meters on complaints of consumers be extended from six months to twelve months; that gas companies should be compensated for being required to remove the test meters when they are found to be correct, and that regular tests be made every five years instead of every three years.

Patents Pertinent to Gas Industry



Portable Photometer Equipped with Standard Lamp

Patent No. 1,218,946; described in Patent Office *Gazette*, March 13, 1917; page 407. Clayton Laing, Chicago, Ill. Filed Jan. 10, 1916. Serial No. 71,187. (Cl. 88-23.)

A stationary artificial light is used as the standard, and a comparator which may be exposed to the standard and to the light to be measured from the essential parts of this piece of apparatus. Shutters regulate the intensity of the light rays in the comparator.

Acetylene Lamp Provided with Independent Gas Chamber

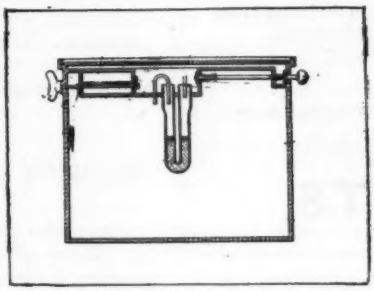
Patent No. 1,219,980; described in Patent Office *Gazette*, March 20, 1917, page 794. Joseph Messina, Berlld, Ill. Filed Aug. 10, 1915. Serial No. 44,767. (Cl. 48-4.)

The feature of this lamp is the gas receiver which consists of an independent element formed with a sleeve like extension to encircle the water delivery tube, and connected with the tube.

Oxygen Generator for Resuscitating Machine Boiler for Compactness and Ease of Transportation

Patent No. 1,212,281; described in Patent Office *Gazette*, 1-16-17, page 721. William W. Talbot, New York, N. Y., assignor to Frank T. Fowler, Chicago, Ill. Filed Feb. 3, 1916. Serial No. 75,940. (Cl. 23-10.)

The main object of this device is to provide an oxygen gas generator for a resuscitating device which shall take up the minimum amount of space for packing in carrying cases, etc. It operates as follows: The main shell is filled with water to such a depth that the chemical cartridge container which is open at the bottom is submerged. The cover is then applied and tightly screwed on to the container. The water coming into contact with the lowermost cartridge, decomposes the same and generates oxygen gas. This gas passes through a pipe to the cap, and through passages controlled by needle valves, back into the water in the main container. The oxygen bubbles up through the liquid, thereby being washed, and collects in the top of the container ready to be drawn off for use or storage. If the pressure exceeds a safe specified limit a relief valve reduces the pressure.



Apparatus Indicates the Composition of Gases

Patent No. 1,220,037; described in Patent Office *Gazette*, March 20, 1917, page 813. Hans Haupt and Martin Werner, Berlin, Germany. Filed April 9, 1915. Serial No. 20,309. (Cl. 73-51.)

This apparatus indicates composition of gases by diffusion. A number of auxiliary chambers of equal size are combined with the diffusing chamber and the air supply chambers of the apparatus. The auxiliary chambers are separated from each other, the opposite end walls of each of these chambers being provided with ports to connect the chambers two ways, one with the supply of atmospheric air and one with the diffusing chamber of the apparatus.

Handle for Cutting Tools or Die Stocks Contains Oil Necessary in Operation

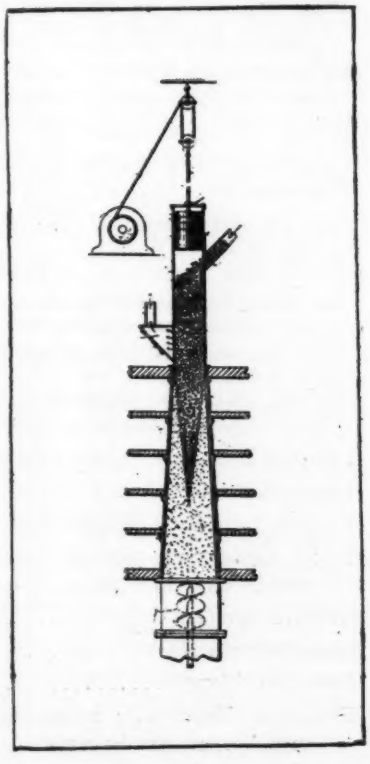
Patent No. 1,215,119; described in Patent Office *Gazette*, 2-6-17, page 222. Morris Cramer, Cleveland, Ohio. Filed July 22, 1916. Serial No. 110,638. (Cl. 10-128.)

One of the handles used to rotate the die stock is hollow and acts as storage for the oil used in the operation. The oil is ejected from the handle by manual means. A tube conveys the oil to any of the dies, the handle being revolved to accomplish this.

Plunger Forces Coal Through Retort

Patent No. 1,217,554; described in Patent Office *Gazette*, 2-27-17; page 1209. Heinrich Begemann, Portland, Me., assignor to William J. Gindele, Pawtucket, R. I. Filed June 25, 1914. Serial No. 847,311. (Cl. 480-86.)

This method for manufacturing gas consists of a vertical externally heated retort with a cylindrical upper portion. The coal is fed into the top of the retort through an inclined chute and the gas is likewise taken off near the top. A plunger fitting closely into the cylindrical portion, moves downwardly past the coal inlet to force the coal through the retort.



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Where the Utilities Stand on Exemptions from the Selective Draft

There can be no suspicion of the utilities selfishly holding back in offering their man power to the selective draft. Their attitude is clear. They will ask for exemptions only for such men who can render better service—not necessarily to the particular company, but to the Nation—by staying home than they can by bearing arms.

Further, the utilities—for it is not likely that any number will fail to adopt the recommendation of Mr. Forstall that classification of employees into non-essential, desirable and imperative classifications—will state clearly beforehand what employees are needed, so there can be no breath of suspicion that the need was felt only after the particular employee had been drawn. It is also quite probable, should the need require it, that intensive efforts will be promptly undertaken to develop substitutes so that men now absolutely necessary to the organization, but of service age, may be available for draft in later drawings.

The spirit of willingness to self sacrifice the utilities are displaying and the very real service they are already rendering through individuals among their personnel in the war, while not in any wise unexpected is truly remarkable. When the history of this war is written off, this journal is convinced, the part the utilities will have had in its conduct will occupy a bright page.

Bringing the War Home to the People of the Country

Particular emphasis was laid upon the urgent necessity of bringing the war home to the great bulk of the people of the country by President A. E. Forstall at last week's meeting of the American Gas Institute. It is recognized that the true gravity of the situation is not generally recognized throughout the country and that the whole vast strength of the Nation cannot be brought to bear until it is.

This condition is by no means surprising. This war and the manner in which it is being conducted are entirely different from anything we have ever known before. The country cannot quite comprehend it. It's too business-like.

The old-time stump speaker, with his eye on political preferment, and his assurances that one American in battle is equal to ten of his enemies, etc., is conspicuous mainly due to his absence. This is a little disappointing to our vanities, but materially to the advantage of our armies. A goodly portion of our volunteers in the past absorbed such teachings altogether too readily; in fact, it was such beliefs that provided the underlying stimulus to many enlistments. Actual conditions proved disappointing and the army moral was depreciated in proportion. Instead of this type of former times we will have an army selected from the legion which, without much outward manifestation of emotion submitted its names for the draft register, then returned quietly to its regular routine work.

This is business-like—and terribly effective. The German army has been effective. No one can deny that. And the German army is a thoroughly welded machine. Our draft army will equal it in this respect at least, and, perhaps, due to the greater mental alertness of the individual, man for man, excel it.

We lack likewise our local idols, without military

training or perhaps even military instinct, through their own popularity recruiting companies and regiments and receiving in payment for their services commissions to command them at a considerable cost in human lives. Instead we have great encampments where hand-picked candidates are being trained for the purpose of turning civilians into military officers. So rigid, so business-like is the process that even men selected under such favorable conditions as these are being turned back by the hundreds as unfit.

All this is for the good of the country, and for the individual who must serve under arms. It insures that he will strike for his country his maximum possible blow and vastly increases his chances of coming through the war alive. But it is obtained at the sacrifice of manifested, exuberant enthusiasm. Only the mechanic is moved to emotional display by the perfect working of a machine.

Mr. Forstall urged upon gas men that by educational propaganda they bring home the facts of the war to their communities. Surely if all sections of our country understood fully the reasons why we are at war, if only from motives of self-interest alone, they would put forth every effort possible to aid in its successful conduct.

The conditions we fight against are conditions that do not threaten property nearly so much as they threaten the individual.

It may be that an unskilled workman with socialistic tendency may not be inclined to raise even a finger to safeguard all the capital in the whole United States. It cannot be expected that he would understand the devious course by which a blow struck at property would be reflected back to him. But it is certain he would stir every effort to prevent such outrages in this country as have been wrought upon the children, women and non-combatants of Belgium, France, Servia, Roumania, Poland and England.

Bring the fact home to him that such possibilities are not beyond the realm of possibility; that the three thousand miles of water have been reduced in importance to a mere ribbon and that man will not be long in getting behind his country in the war it is waging.

Mr. Forstall's plea was that the gas man, as a leader in his community, should constitute himself a missionary of the great doctrine in that community. THE AMERICAN GAS ENGINEERING JOURNAL heartily endorses this plea, but suggests that in so doing the gas man does not forget his own organization. We are out of ear range of the rumble of the guns. Our only knowledge of what is going on comes to us on the printed page. The manager reads the newspapers. So do those with whom he most frequently rubs shoulders. But does the stoker or the welder or caulker out on the lines?

Talk to the men. Tell them what is happening in the world. Make clear to them that the great work of the whole civilized world at the present time is not so much to provide creature comforts and conveniences for the generations yet unborn, but to make their very existence—for a Prussianized World would not permit of a mode of life that would seem existence to a people which has known the advantages this country affords—possible. Impress upon them what the price of defeat would entail.

Once these men have been won to an appreciation of what the war means they would themselves become missionaries of the cause, taking the lesson to classes the manager himself could never hope to reach directly, yet which are the classes in which the teachings are most necessary.

A Possible Effect of the War in the Utility Field

It now seems probable that the most important military contribution this country will make in the war against Germany will be in the air fighting. Almost a billion dollars will in all probability be spent on this branch of the service within a relatively short time. An aerial fleet of a hundred thousand machines is being talked of. It does not take much imagination to picture some of the results from this departure.

To what extent we are indebted to our great inventors—those whose names are familiar to all of us—for our present state of development in the mechanical field, and to what extent, on the other hand, we are so indebted to the countless obscure mechanics, who have from time to time added this or that small kink to the machines they were operating, or have by the elimination or substitution of parts simplified them so that instead of a cumbersome, unwieldy apparatus we have the almost perfected machine of to-day, is problematical in the extreme. It is certain, however, that the contributions of the latter have by no means been inconsiderable.

Thus it will be with the airplane. Its development and improvement will be immeasurably hastened.

Up to the beginning of the war it was, as in the early days of the Wright brothers, very much in the nature of a plaything. That is, it served no useful industrial purpose. Due to the war many minds, which, hitherto, never thought of the airplane have been concentrated upon it.

Each new recruit added to the aerial forces of the opposing army has become a specialist in this field. The number is to be vastly augmented by this country's entrance. And these minds, let it be remembered, are the minds of men living an intense life; minds which are alert to a degree they never would have been without its stimulus.

Because of the war the airplane will become a commercial possibility; a useful servant of man, years before it otherwise would have.

But what has this to do with the utilities? Relatively little as regards the airplane directly. But, possibly, a great deal as regards its engine.

How much we have to thank the popularizing of the automobile for the present efficiency of the gas engine would be difficult to estimate. In this war hundreds of thousands of men will be tinkering with internal combustion engines; those in airplanes, in tractors, in motor trucks, in submarines, and in passenger cars; with the stake their lives.

Inventiveness will be stimulated. A great proportion of the civilized world is going to be vastly more familiar with the gas engine than it has been hitherto.

This journal is very much of the opinion that when a realization of what the gas engine even of to-day actually is and what it will accomplish becomes general the industrial world is going to experience somewhat similar emotions to those of the seeker, who after traveling the world over in quest of diamonds, returned home to find a mine on his own farm. But the gas engine of a few years hence will be a different thing again from the gas engine of to-day.

In England they have discussed power generation

through gas engines at the mouths of coal mines; great electrical central stations placed at the source of supply to utilize inferior coals and save transportation. This journal, while it believes that the electric central station will do well to keep its eye on gas engine development, has little to fear from such competing central stations. Its great effort has been to eliminate the isolated plant. With success almost within reach of its hand, it is faced, through the gas engine, with the same competition all over again, only on a greatly extended scale.

It has been shown that with the present gas engine and with normal domestic rates for gas it would be possible for an average building housing several families to generate its electric requirements on the premises, using a gas engine, with an estimated saving in cost. How much more so would this be the case with a greatly improved gas engine and the reduction in cost of gas that would result in a straightening out of the load curve, with the inevitable added economy in the general elimination of the candle power standard?

A Nation of Bond Buyers—Its Significance to the Gas Industry

Up to our latest advices the indications are that the U. S. Liberty Loan issue of $2,000,000,000 has been a billion dollars oversubscribed. The total number of buyers is unprecedented—much over a million. Economists tell us the effect of the issue on the economic life of the nation will be beneficial in the extreme. It has made us a nation of bond buyers. A more healthy development from the viewpoint of gas company financing can scarcely be imagined.

Hitherto the small investor has seldom placed his funds in bonds. One reason is that the denominations most bonds have sold at means a big sum to him. Another is that his surplus has come hard. It had an exaggerated value in his mind. He looked for big returns on it and as a result fell easy prey to unscrupulous promoters. Once bitten the savings bank account became the principal means of placing his savings.

The bond buyer is by nature a conservative investor. There is little opportunity for speculation in bonds. The speculative investor goes in more for common stocks. There is an opportunity there for the dividends to amount to an excellent rate of return on a sum several times the par value of the stock.

The type of investor to whom bonds appeal is the type which buys gas company securities. There is little of the lurid in gas company investments. Regulation and the high value gas company executives place on good-will keep the returns down to a normal figure. Because gas is a necessity, this type of investment is a very attractive one from the point of view of safety of principal.

The manner in which the working class in this country have invested their funds in the past has been pathetic. Seek out a dull-looking foreman, who is distinguished among his fellows for his saving proclivities, on any construction work and ask him where he has his money. It is more than probable the answer will be that he is buying lots he has never seen. Others are fascinated by wildcat mining and drilling propositions. The Liberty Bond idea has penetrated to this class. Its education in finance is beginning.

It is to be hoped the gas industry will read the handwriting on the wall. The Government has shown the way. Small denomination bonds and payments by installments have proved the entering wedge.

We were very much gratified to note that one gas company at least—the St. Louis County—has profited by the experience. An issue of its securities is already being marketed in a similar manner. Such financing spreads the security owners out over wide ranges and insures against regulation harassment. As a general thing the company will in time be owned largely by its employees and the people of the territory it serves. The first will make for efficiency and the elimination of labor difficulties; the second for a sympathetic and interested body of consumers and the consequent freedom of the company from unjust and unreasonable public interference.

Electric *vs.* Gas Cooking

Provided a customer is willing to pay about half as much for a gas range as she pays for an electric range she can secure a gas range which is constructed so much like an electric range that there is practically no difference in the baking results. Experiments that have been carried on in England prove that almost identical results can be secured with gas and with electricity. The main difference between the two always being the lower cost of gas.

The electric lighting of to-day was made possible to a certain extent through the policy of gas companies to allow people to burn open flame burners. The electric industry is now invading the domestic cooking field. A great many electric ranges will be sold on the fallacy that electric cooking is superior to gas cooking unless gas companies show their consumers that with similar equipment there is practically no difference between gas and electric cooking.

This does not necessarily mean that gas companies will have to discontinue the sale of the present style of cooking appliances. There are many people who will continue to use their present equipment and the majority of people will continue to buy new equipment of the style that has become standard because it is cheaper in price and gives very satisfactory results.

Within a few years, however, many gas companies are going to feel the competition that electric cooking will offer. Now is none too soon to prepare to meet this competition. Possibly the best way to do so is to teach all employees and the public that gas appliances are now on the market that will accomplish any of the results that can be accomplished by electric cooking.

If one is satisfied with the present gas cooking appliances there is no reason why he should change. There are many people, however, who are always looking for something different. For these people there are automatic gas ranges, fireless cooking gas ranges, surface combustion gas ranges, and gas appliances of all descriptions. Many of these the public knows little or nothing about. In fact there are many gas men who are ignorant of what is actually taking place in the gas appliance field.

If the gas cooking load is to be protected it will be necessary to change this state of affairs. It will be necessary to teach the gas company employees as well as the public about these new appliances, what they will do and what they are intended for. If this is done the gas business need not fear the competition of the electric companies.

Special English Correspondence

Monthly Letter, from Norton H. Humphrys, Salisbury, England

Experiences in Making Gas from Wood—Extending Use of Coke—Coal Gas for Motor Busses an Actuality—Some Notes Preliminary to the Meeting of the Institution of Gas Engineers

The scarcity of coal, not so much in England as in other parts of the world, has led to much research in the way of utilizing any presentable local product as a substitute. This is especially the case in Italy, and wood is being used in several parts of France. At one works, thick billets cut from the middle of the trunk of Sea Pine are made up into bundles of a size to fill a retort, and secured with iron wire. A charge of about half the weight of coal is used, but as it is worked off in half the time, the productive capacity is not reduced. Running one charge of wood to two of coal was not found to appreciably affect the calorific value of the gas. Five to 10 per cent of small coke or charcoal remains in the retort, but the drawn charge is smothered, in preference to being extinguished with water. The remarkably low proportion of solid residue suggests that the wood must be very resinous in character. The tar is lighter and difficult to separate from the water, which is of an acid character. The make of gas per ton and the labor charges are practically the same as with coal. The net cost of wood is about $12 per ton, and of coal $14 per ton. (One ton = 2,204 lb.)

At another gas works, wood is used in quantity sufficient to supply 10 to 20 per cent of the total make of gas. The charge for a 10 ft. x 25 in. x 14 in. retort is 100 kilogrammes of fir, or 120 of oak (one kilogramme = 2.2 lb.) and the yield per charge is about 900 cu. ft. of gas. Here it was found necessary to work coal alternately with wood in the same retorts, as the continuous use of wood was attended with the formation of a grey viscous deposit in the ascension pipes, that is difficult to remove. The residue in the retorts sold readily at prices sufficient to cover 80 per cent or so of the cost of the wood, reducing the net cost per ton to about $2 for fir, and little less for oak.

At Santos (Brazil) a proportion of wood has been in use for some time, and local coals and shales, though of very inferior quality, are under trial. At Bahia Blanca, promising results are being obtained from a hard native wood, and a thick heavy local oil, the quality of the gas being more uniform than could be maintained with coal. The oil is quite inapplicable to plant of the ordinary type, and new methods had to be devised before satisfactory results could be obtained. At present, the cost does not compare with coal, but with prolonged experience improvement is expected, and the possibility of permanently dispensing with coal is suggested.

Mixing with Blue Water Gas

In England, the Controller of Coal Mines has directed attention to the importance of restricting both the consumption and transport of coal, and suggests as a means to that end, the intelligent admixture of a proportion of blue water gas. With certain precautions, it may be possible to use as much as 25 per cent, or even a larger quantity of slightly carburetted gas. This is harking back to a proposal put forward by the late Professor Lewes some years ago, as a sound commercial proposition, which has been matured in practical shape by Tully, Dellwik, Kramer, Aertz and others.

The high prices, inferior quality, and irregular supply of coal have directed attention to the utilization both of gas and coke for fuel purposes, in directions hitherto considered impracticable. Coke has been adopted to an important extent in the streets of London and elsewhere, both for passenger and cargo road motors, and a movement has been initiated for the registration of gas works throughout the country, who will guarantee to hold stocks in readiness for this line of business. The average daily consumption on a passenger car is 4 cwt.

A writer to *The Field* refers to a coke fired steam chassis weighing only 50 cwt, as the ideal for work on land, or with a change of wheels, on the public roads. The light weight and great power commend it for general farm use, and with a two-wheel trailer, it will carry bulky loads such as hay or straw.

Tests included in the official reports of the Road Automobile Club Committee show that this type of service is not only quite practicable but decidedly economical. The average consumption on a 219-mile run with a load of 55 cwt, was 4 lb. per mile.

At Deptford, gas coke is used under the boilers for the public baths, and with unfavorable conditions the cost for twelve months working has been $7,200. At current prices, coal would have cost about $8,900. The cost of alteration in the furnaces to suit the new fuel was about one-tenth of the saving. In addition to the personal, there is also a National gain, a feature that is peculiar to almost every application of gas and its products. If all raw coal had been used, the whole of the by-products would not only be wasted, but go to pollute the atmosphere; but the substitution of coke has incidentally enabled 9,600 gal. of tar, 3,000 gal. of toluol and benzol, and 10 tons of ammonium sulphate to be added to the National resources.

Economy in Use of Gas

Gas, compressed or otherwise, is also being turned to account. In the absence of compressing machinery or containing cylinders, it is carried in large canvas bags, similar to those formerly used in connection with optical lanterns. The Great Grimsby Tramway has been running a passenger car on gas contained in a bag of 500 cu. ft. capacity, fitted on the roof, with such satisfactory results that two others are being similarly equipped. A slight adjustment enables the engines formerly supplied with petrol to be used for coal gas, and petrol is also sometimes carried as a stand by. The same system is in use at Harrogate, at a cost of one-third of the present price of petrol. The average consumption of gas is 40 cu. ft. per mile run, and on a good road may be as low as 35 cu. ft. The corresponding consumption of petrol is 6 to 7 gal. The bag has to be filled

three times during the day, but that operation only occupies three minutes.

The annual report of the Council of the Institution of Gas Engineers, issued in anticipation of the meetings to be held in London on June 5, and following days, is quite a thick pamphlet comprising 68 pages, and nearly as many different headings. The first day is to be devoted to business meetings, under the guidance of the President, A. E. Broadberry, and the second to a visit to the gas and electricity works of the Tottenham District Light, Heat, and Power Company, one of the few "combined" undertakings in England, where the principal feature will be a new section capable of producing 4¼ million cu. ft. of gas per day. On the following day a mass meeting of Commercial sections of affiliated District Associations will be held.

Anything approaching a full review of this important document is out of the question, but a few special features may be noted in passing. The first is an expression of gratification at the continued and increasing help rendered to the High Explosives Department of the Ministry of Munitions by the gas undertakings of the United Kingdom, in supplying essential products for the manufacture of high explosives, and that the Director-General of Explosives Supply, the Rt. Hon. Lord Moulton, K. C. B., F. R. S., has consented to be nominated for election as an honorary member of the Institution, and as president for the ensuing year. The second is a copy of a letter sent to the Secretary of the American Gas Institute, on the occasion of the entry into the War of the United States of America as our ally, expressing sincere greetings and congratulations. And a third refers to the labors of a committee appointed for the purpose of assisting members of the Institution of all grades who have joined His Majesty's forces, to return to their respective positions after the War, and to arrange that their interests shall not suffer by reason of absence.

Passing on to more domestic matters, satisfactory progress is evident in the cause of Education and Research. Refractory materials, Science, Industrial and General Engineering, Gas Lighting, Heating and Ventilation, Life of Gas Meters, Illumination and Street Lighting, Naphthalene stoppages, Canal Traffic, and Fuel economy, are among the subjects that have been under consideration during the year. The report also refers to Coal and Gas Oil Supply, Standard of Calorific Power, Co-operative Tar Distilleries and Wages. The pressing need of an effort towards the provision of a building in which the work of the Institution and kindred bodies could be adequately carried out, has had consideration, and the Council have decided that in the interests of the industry it is desirable that steps be now taken in that direction, and they have nominated a large and influential committee to deal with the subject. Although building considerations are out of the question during war, the acquisition of a site, and plans for a suitable structure, also the means for raising the necessary funds, may be at once taken in hand.

The absence of social or recreative features is probably due to a correct reading of the general wishes under present conditions, but apart from that, the technical proceedings are decidedly thin. District Associations are able to continue papers and discussions with unabated vigor, and this especially applies to the Junior Associations, whom one might reasonably suppose to be hit the hardest by war conditions. But the Institution has for the third time in succession passed over one of its principal objects, the reading of papers and communications, and that at a time when there simply is a plentitude of suitable subjects.

Many Prominent Western Gas Men at Pacific Coast Gas Association Dinner

Second Get-Together Dinner of the Season, Held at Los Angeles, a Big Success

The Pacific Coast Gas Association held its second annual get-together dinner of the present season at the Hotel Alexandria, Los Angeles, on the evening of Saturday, June 9.

It was in every respect a representative gathering of the leaders of the gas industry on the Pacific slope. The "Pacific Service" contingent consisted of Henry Bostwick, Van E. Britton, John A. Britton, Jr., Leon B. Jones, W. M. Henderson, M. L. Neely and F. S. Myrtle. The large majority of the attendance came from the southern parts, the Los Angeles Gas & Electric Corporation being notably well represented. There were present also a number of appliance men, a branch of the industry that is steadily augmenting its membership in the association. Altogether, an assemblage of one hundred and thirty-two gathered at the dining tables spread in the hotel ballroom.

President C. B. Babcock was in the chair. During dinner some attractive "stunts" were given by fair local entertainers, who sang and danced exceedingly well. A prominent feature of the vocal part of the entertainment was the new patriotic song "We'll stand by Uncle Sam," the music of which was composed by a "Pacific Service" man, H. G. Ridgway of the Marin District. After dinner came the speech-making program led off by Henry Bostwick, the association's secretary. It was cheering to note the receipt of thirty-one new applications for membership into the Association. Loud applause greeted Mr. Bostwick's announcement of the decision of the executive committee to hold the convention at Santa Cruz this year according to schedule and not follow the action of some Eastern organizations in postponing their annual gatherings on account of the war.

Wm. Baurhyte, who with Champ Vance headed the Los Angeles Gas & Electric Corporation's contingent, spoke words of welcome in his usual happy way. Then, in order, followed John A. Britton, Jr., of "Pacific Service," editor of the Wrinkle department; A. B. MacBeth, Southern California Gas Company, Los Angeles, chairman of the Advisory Board; Paul Overton, Los Angeles Gas & Electric Corporation, chairman of the Legislation and Taxation Committee. All reported progress. B. S. Pedersen, San Francisco, chairman of the Gas Exhibits Committee, told of the arrangements made for a representative exhibit at Santa Cruz this year. Paul Haugh, Los Angeles, told some clever stories. Leon B. Jones, of "Pacific Service," member of the Executive Committee, spoke of the progress of the gas industry and its prospects. F. S. Myrtle, "Pacific Service," reported for the Committee on Publicity. F. S. Wade, Southern Conuties Gas Company, and C. A. Luckenbach, Los Angeles Gas and Electric Corporation, both directors of the Association, closed the speech-making. Mr. Luckenbach, amid great applause, presented a paper read by him to the employees of his company on the subject of the Liberty Loan bonds, in which he urged quality as against quantity in measuring patriotic support.

News of the Gas Industry

ONE OF THE BANDS IN BALTIMORE'S LIBERTY LOAN PARADE

Medina, N. Y., Plant Ceases Operation

A public meeting was to be held shortly in the Medina City Hall at the instigation of the local board of trustees, and having to do with the announcement of the Medina Gas Company that it will go out of business within the next few days. This affects Medina and surrounding country.

The cause given for this action is the excessive price of coal, the possibility of not being able to get any coal at all, and the small earning power of the company in Medina. The company offers the village an opportunity to operate the plant, paying only the expense and charges incidental thereto.

The local board of trustees have given no indication of what action it will take, yet there is a possibility that the question of the municipality purchasing the gas plant and operating it may be submitted at a special election of the taxpayers of Medina. The local gas company, in sharp competition with the Western New York Utilities Company, which furnishes electric light has had a task for a year or more to make its proposition a profitable one.

In writing the local board of trustees, the gas company reminds them of the acknowledged scarcity of coal at this time, and that what little coal can be obtained is held at prohibitive prices.

The company is owned by Thomas G. Hinds of Jersey City, whose attorney is Joseph A. Duffy, also of Jersey City and the gentleman who sent the communication to the local board of trustees.

Mr. Hinds purchased the local gas company from Receiver Milford W. Childs about three years ago, and it has been operated by Superintendent John Collins of Medina since that time. Its franchise is extremely liberal, and, placed upon a substantial basis, it is thought to be a good investment.

Princeton, Ind., Plant to Be Sold at Auction

The Consumers Gas plant, franchise and privileges, will be sold at a sheriff's sale, June 29, to the highest bidder. Terms of sale, according to Fred W. Freese, president and general manager, are one-third cash; one-third thirty days; balance sixty days.

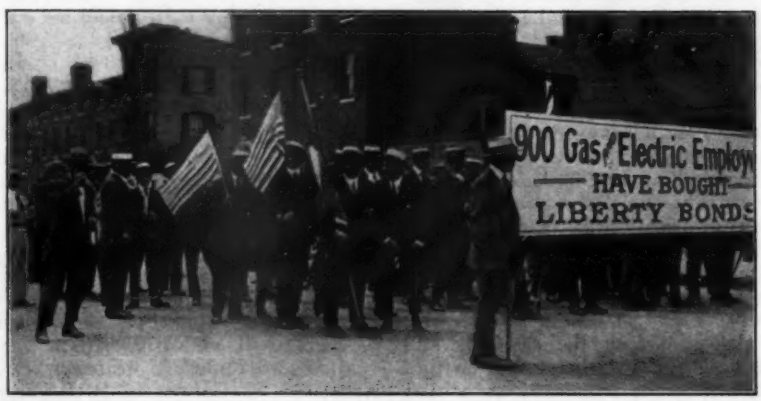
Baltimore Company Organizes Successful Liberty Loan Parade in Two Days

The patriotic spirit aroused by the employees of the Consolidated Gas, Electric Light & Power Company of Baltimore is certainly worthy of much praise. Not being satisfied with their generous part in the Liberty Loan success, the subscribing of $200,000, a most successful Liberty Loan Parade was organized within two days, and was a tremendous success.

About 700 employees of the company marched, some carrying suitable banners to indicate the part taken by the gas and electric organization, while others helped to carry several huge flags, stretching across the full width of the street.

Charles M. Cohn, who was chairman of the public utilities section of the Liberty Loan Committee for Maryland, headed the public utilities division as marshal, accompanied by Thomas A. Cross, president of the United Railway & Electric Company, and Douglass Burnett, manager of the commercial department of the Consolidated Gas, Electric Light & Power Company of Baltimore. Herbert K. Dodson was chairman of the parade committee.

The two accompanying illustrations taken from the monthly bulletin published by the Baltimore company show some of the members of the organization doing their part in the successful parade.



GAS AND ELECTRIC EMPLOYEES FORMING FOR PARADE

Old Colony Company Announces Increase at Weymouth, Mass.

The Old Colony Gas Company notified the Board of Selectmen that the price of gas, on account of prevailing conditions, will be advanced to $1.50 for each 1,000 feet, and the letter was referred to the town council.

Severe Storm Causes Cave-in and Broken Mains at Hoboken, N. J.

Hoboken was the scene of a cave-in that occasioned a vast amount of inconvenience during a very severe storm June 15. Shortly after 4 o'clock, the foreman on duty at the sewer excavation at Fourth and Washington Streets noticed that the ground was beginning to sag a little and in a moment the street caved in from the curb on the east side to the trolley tracks.

The pressure of the water had caused the old sewer to burst and the torrent rushed into the excavation being made for the new sewer, and which includes a tunnel under Washington Street.

Immediately after the street had caved in there was a small explosion which lifted a number of manholes. This was followed by a flaming jet of gas that reached as high as the houses on either side, licking around them in a manner that put them in imminent danger of being set on fire. The crossing of the electric wires in the immediate vicinity of the escaping gas ignited the latter. The water from the broken main had but little effect on the flaming geyser of gas, but sufficed to prevent it from reaching the buildings on Washington Street.

The fire department was summoned to the scene and a stream was turned on the burning gas, which confined the flame to within 12 or 15 feet of the street surface and saved the adjoining property. This had just been accomplished when the rush of water through the tunnel toward Fourth Street caused the west side of Washington Street to cave-in also. In this case, however, there was no explosion and the asphalt merely sank gradually several feet below the level, cracking as it went.

At 10 o'clock the gas was still burning and was being kept within bounds by the stream of water that was played on it. The most serious effect of the breakage was the fact that Washington and Hudson Streets, together with the connecting lateral streets, were plunged into darkness. Lightning struck at probably two score of places, but only one fire of serious importance resulted. This was the destruction of an oil tank at Caven Point, Jersey City.

Illuminating Engineering Society Elects New Officers

Gas Industry Well Represented By Many Prominent Men

The Illuminating Engineering Society Bulletin has recently made the announcement of the new officers of the Council for the coming year. It is gratifying to note how many of these men are representatives of the gas branch of illumination.

The election of the following officers of the Council for the fiscal year 1917-1918, was confirmed by the Council on June 14, 1917. These men were elected to fill the offices made vacant by expiration of terms:

President: G. H. Stickney.

Vice-Presidents: W. G. Hoyt, C. E. Stephens.

General Secretary: Clarence L. Law.

Treasurer: L. B. Marks.

Directors: R. ff. Pierce, S. C. Rogers, P. S. Young.

The election of the following Section Officers also was confirmed at this meeting:

NEW ENGLAND SECTION

Chairman: S. C. Rogers.
Secretary: M. R. Pevear.
Managers: J. W. Cowles, David Crownfield, C. A. B. Halvorson, R. G. Hudson, George P. Smith, Jr.

PITTSBURGH SECTION

Chairman: L. O. Grondahl.
Secretary: W. P. Hurley.
Managers: E. J. Edwards, L. J. Kiefer, Harold Kirschberg, J. L. Minick, H. N. Muller.

NEW YORK SECTION

Chairman: A. S. McAllister.
Secretary: Norman D. Macdonald
Managers: D. F. Atkins, S. B. Burrows, W. J. Clark, Alex Maxwell, A. L. Powell.

PHILADELPHIA SECTION

Chairman: Walter Forstall.
Secretary: Unit Rasin.
Managers: John R. Hare, J. B. Kelley, H. H. Ganser, G. B. Regar, C. W. Wardell.

CHICAGO SECTION

Chairman: E. H. Freeman.
Secretary: James J. Kirk.
Managers: C. A. Carpenter, Alfred O. Dicker, A. H. Meyer, Fred A. Rogers, J. L. Stair.

Mr. Stickney was born in Buffalo, N. Y., 1872, and graduated from Cornell University with the degree M. E. (E. E.) 1896. Immediately after graduation, Mr. Stickney went to the General Electric Company's works at Schenectady where he spent a year and one-half in the Student Course.

Following this course he acted as first assistant to W. D'A. Ryan in charge of the lighting department of the General Electric Company's works at Lynn, Mass. At this time his work consisted of factory, commercial and engineering development of the arc lamp. Some time after that he was instrumental in the development of the high efficiency incandescent lamps and equipments.

The next two years were spent as the first assistant to W. D'A. Ryan in similar work at the Schenectady plant.

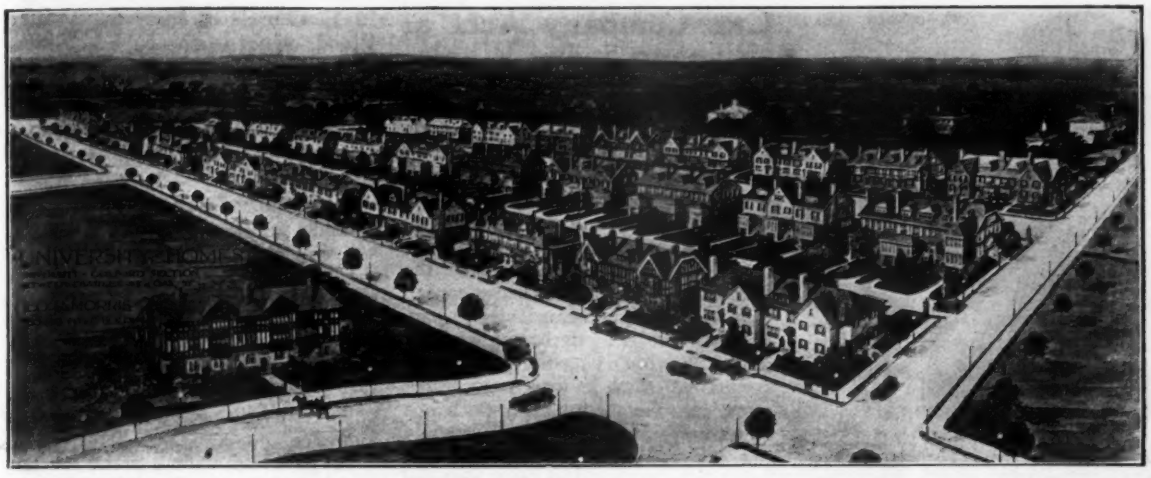
In May, 1911, he took charge of Illuminating Engineering of the Harrison works of the General Electric Company as assistant to the sales manager.

While at this plant he developed a number of lighting appliances and collaborated in designing many more.

He has written numerous company publications and many articles and papers on illumination which have been published from time to time in various technical journals.

Mr. Stickney has served on many committees in different societies, whose functions dealt with work having a bearing on illumination. He is a member of the following technical and engineering societies: Illuminating Engineering Society, American Institute of Electrical Engineers (associate), National Electric Light Association, American Association for the Advancement of Science, Association of Iron and Steel Electrical Engineers, Association of Railway Electrical Engineers, American Museum of Safety, Engineers' Club, New York.

Prior to his election as President, he held the following offices in the Illuminating Engineering Society: Secretary (charter) New England Section, 1906 (one year); chairman New York Section, 1911 (two years); vice-president, 1913 (two years); chairman of Committee on Papers, 1914 (three years); general secretary, 1916 (one year).



A NEW DEVELOPMENT IN THE UNIVERSITY-GUILFORD SECTION. EACH HOUSE TO BE EQUIPPED WITH THERMOSTATICALLY CONTROLLED GAS FIRED STEAM BOILER AND WATER HEATER

Baltimore's House Heating Success a Forerunner of Big Business Coming to Many Gas Companies

Results and Experiences of Past Season Prove the Value of This Branch of Industrial Work

The heating season has ended, states the Consolidated Gas, Electric Light & Power Company of Baltimore in a specially prepared booklet, entitled, "House Heating with Gas in Baltimore a Success," and we have received a large number of letters from consumers who have used no other fuel but gas throughout the winter. They speak more clearly and eloquently than any other description, of the satisfaction and comfort that has been brought into Baltimore homes by gas heating.

The letters and straightforward opinions received and reprinted in this booklet of which we speak certainly are convincing, especially to the doubting house owner.

The Bryant Tubular Gas Fired Boiler which this company installs to supply steam and hot water heating systems represents one of the most advanced methods of applying gas to the heating of homes. Its efficiency is the maximum obtainable with a central heating plant, thereby assuring a minimum operating expense.

The boilers are composed of from 3 to 41 vertical sections, each with 6 horizontal tubes crossing the fire below. These sections rest on a cast iron base into which is inserted a gas burner for each section. Each burner is controlled by a separate gas stop, and as many burners may be turned on as the weather conditions require. The boilers can be easily enlarged to take care of any additions to the building.

There is no dirt, soot or odors formed, and the fire always burns with a hot, blue flame. The control apparatus of the steam boiler is so sensitive that the steam pressure will at no time vary more than one-quarter of a pound.

Success of Hot Air Gas Furnaces

During the past year a number of hot air furnaces have been installed and have produced really wonderful results. In a number of cases the cost of gas has been considerably less than the cost of coal and the regulation of temperature in all cases has been perfect.

The Columbus Hot Air Furnace which is sold by the gas and electric company will deliver a continuous supply of pure, warm air as long as heat is needed. The circulation of warm air will begin three minutes after the burners are lighted; a feature of particular advantage during changeable weather. Due to the very long travel of the hot gases through the furnace the maximum amount of heat is absorbed by the circulating air, making this one of the cheapest means of heating houses with gas.

Hot air furnaces are made in various sizes to take care of different houses, or they can be furnished as twin furnaces for very large buildings. As a general rule they are placed in the position formerly occupied by the coal furnace, but when the owner desires, the gas and coal furnaces can be connected in tandem so that either may be used independently of the other.

Hot air furnaces can be controlled by thermostats or by hand.

Thermostatic Temperature Control

One of the most delightful features of house heating with gas is the ease with which it can be regulated and controlled by thermostats. When gas burners are installed in a furnace, a thermostat should be placed in the living room or some other central point of the house. The pointer of this thermostat can be set at 70 degrees or any other temperature that is desired. The thermostat will keep the gas burning until this temperature is reached and then turn it off. When the temperature begins to drop, the gas will automatically light again and the temperature of the house can be kept at the same point as long as desired.

The Minneapolis heat regulator is a device installed in connection with gas boilers and furnaces to automatically control the supply of gas as the outside temperature varies. It consists of two parts, a motor and a thermostat. The motor is placed in the basement near the furnace and alternately closes and opens a gas valve which controls the main gas burners of the furnace.

The thermostat is placed on the wall of the dining room or living room on the first floor, and connected to the motor with a small insulated cable. As the temperature of the room rises, a metal coil in the thermostat expands and closes an electric circuit, which

HEAT REGULATOR WITH CLOCK ATTACHMENT

causes the motor to revolve and close the gas valve. As the room temperature drops the coil contracts and closes another electric circuit, causing the motor to again revolve and open the main gas valve.

The thermostat is extremely sensitive and will turn the burners on or off with a variation of two degrees in the room. This entirely relieves the owner of attention, bother or thought and will at all times keep the temperature of the house even. The room temperature desired is indicated by a pointer on a dial and may be set at any degree of heat, to suit the fancy of the owner. In addition, a clock is provided to automatically advance the pointer from the night temperature to the desired day temperature at any predetermined time.

Minneapolis heat regulators are furnished in several designs. They can be operated by electricity, by a simple connection to the house wiring, or may be equipped with a spring motor which is wound two or three times a week. The clocks are either eight day or one day. All models are provided with accurate thermometers, which register the actual room temperature at all times.

North Carolina Report Looks Promising

A large graded school at Rocky Mount, N. C., is now being equipped with a domestic science outfit by the Rocky Mount Public Works, as this branch is now to be incorporated in the school curriculum.

The May sales of this company showed an increase of 69 per cent over the May sales one year ago, and this month they are pushing ahead in about the same ratio, according to information received from J. Bowdoin Cocke, superintendent of gas, to whom this journal is indebted.

The activities in other departments, also, hold forth a promising aspect.

Gas Company Acts as Pivot to Swing Whole Community Enthusiasm

Flag Raising at Millville, N. J., One of the Biggest Successes of Its Kind

Never before had Millville, N. J., turned out in such numbers to do honor to the flag at an unfurling as it did when the employees of the Millville Gas Light Company spread to the breezes a beautiful big flag, which they had purchased, from a flag pole which was the gift of the company. But it was very much more than a company affair; it was a community affair—and right royally did the community enter into the spirit of the occasion and respond to the invitations to participate in the display of patriotism.

All classes were represented. The boys of '61, gray and bent, but with the fire still in their eyes, were there, as were the boys of '17. The business man showed his interest by dropping his affairs for the time and marching in the line.

The schools were represented in goodly numbers; the girls, many of whom may be called on to act as nurses, were in the forefront of the line, and the women, proved their fealty to the flag which has ennobled them more than that of any other nation, by turning out in large numbers.

Officials and firemen were there, too, lending an official sanction to the affair and completing its all-round character.

About a hundred of the employees of the gas company, bearing flags, were the last of the line on foot.

A long line of automobiles gaily decorated, brought up in the rear, making in all a column nearly a mile in length.

The line of march was down Second to Main, to High to the plant of the gas company on North Second Street, east of Millville Hospital.

Upon reaching the plants of the gas company many were surprised at the extent of the works, and noticed a large new building with new equipment by which the great mains of the company, 175 miles in length, throughout Cumberland and other counties, may be filled with high pressure gas.

On a small platform directly beneath the flag sat Rev. H. L. Burkett, pastor of the Trinity M. E. Church, who presided; Rev. E. A. Robinson, pastor of the First M. E. Church; Rev. Thos. Brock, pastor of the First M. E. Church, of Vineland; Walter Wood, owner of the public utilities, and Captain H. G. H. Tarr, of Philadelphia, a veteran of the civil war and construction engineer.

The civil war veterans occupied a large platform in the rear of the smaller ones.

After music by the bands, and the opening prayer by Rev. Mr. Robinson, Rev. Mr. Burkett introduced as the first speaker, Mr. Wood. He spoke very briefly and neatly introduced Captain Tarr.

Captain Tarr expressed pleasure at being permitted to speak and said that it was always good to have an opportunity to speak to an American audience.

He paid high tribute to the foreign born American citizens who are ready to go to the front if necessary, and felt that they deserved equal or more credit for their stand than a native born, from the fact that they had given up their homes and their own lands and come to America at a great sacrifice and are now ready to die for the country of their adoption.

Captain Tarr read an article which he had written shortly after Gettysburg entitled, "The Last Night at Gettysburg." He closed with an excellent poem, and proved that all who would be obliged to go into the terrible struggle now at hand might have the blessing of God.

The most beautiful flag, bought by the employees, was then raised to the top of the lofty pole, erected by the company, by Miss Grace Jones, daughter of W. R. Jones, plant superintendent. Hundreds of tiny flags fell from the folds of the emblem as it was unfolded to the breeze.

The flag was cheered and the company sang one verse of "America."

A salute was fired by the Fame Guards.

The last orator of the day was the Rev. Thomas Brock, and he gave one of the most stirring patriotic addresses ever heard in Millville. He was frequently interrupted by applause.

To S. J. Franklin, General Manager of the company, and his generosity, is due in a great part the success of the occasion.

New Well at Cabin Creek

United Fuel Gas Company, a subsidiary of the Columbia Gas & Electric Company, has just bought in a well in the Cabin Creek district which shows a flow of from 125 to 150 barrels a day.

Demonstration Lecture on Canning and Preserving One of the N. C. G. A. Aids in Present Campaign

Lecture Prepared with the Help of Mrs. Ida C. Bailey Allen to be Offered to Gas Companies for Use by Cooking Instructor

As an indication of one of the many ways that the National Commercial Gas Association is earnestly pushing the present campaign for Home Canning and Preserving, this journal reprints the Demonstration Lecture which is to be used in the present campaign.

DEMONSTRATION I

Canning and Preserving June Products

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Demonstration Lecture to last from one hour and twenty minutes to one hour and a half.

General Suggestions for Procedure

I. Remarks on the national crisis and the general mobilization of the housewives all over the country to avert waste, and foster conservation. The averting of food waste means the utilization of everything that is edible—not only the use of all possible left-overs, but what is much more important at present, the preservation by canning, preserving and evaporating (or dehydration) of all edible products. The farmers all over the country are raising much more than the country woman can care for, and her city neighbors must do their share by putting up and evaporating as many foods as time and pocketbook will allow.

Demonstration

Made up of recipes in the June Folder, No. 1:

Canned Asparagus.
Canned Pineapple.
Baked Strawberry Preserve.
Evaporated Peas.

II. Explain the difference between the old method of canning and the new method. The latter sterilizes the products in the jars, and the tops are not removed before sealing. By the old method, the product was cooked and packed boiling hot into sterilized jars, and bacteria were liable to get in before the rubbers and caps were adjusted. Therefore "bad luck" resulted. By the intermittent or fractional method, the products were boiled or sterilized on three successive days and bacteria and spores were killed, but the fruit was overcooked, the jars stood about for a considerable time, and the foods frequently spoiled because of excess acids which they contained. By the new cold-pack method, the foods are scalded or blanched, then plunged in cold water, or dipped. The scalding eliminates the strong acids, loosens the skin so that it can be removed witth the smallest possible loss of pulp, and starts the flow of coloring matter. This is immediately arrested by the plunge into cold water.

The technical terms used in the new cold-pack method are as follows. Explain them thoroughly.

a. *Cold-Pack.*—The packing of uncooked or blanched foods, together with liquid, as syrup, water, soup-stock, or vegetable juice, into clean jars, covering, and then sterilizing or cooking them with their contents by means of boiling water or steam.

b. *Scalding.*—The dipping of a vegetable or fruit into boiling water to loosen the skin so that it can be removed with the least possible loss of pulp, to remove undesirable acids, and to start the flow of the coloring matter; this must be arrested immediately by the cold dip.

c. *Cold Dip.*—The dipping of the scalded fruits or vegetables immediately into cold water for two or three times to arrest further cooking, and to harden the heated pulp. This coagulates the coloring matter so that there will be less loss of color during the sterilization period and at the same time the products may be handled to much better advantage in packing.

d. *Blanching.*—To boil or steam the product to be canned for a brief time before packing into the cans. Unless it is necessary to remove a strong flavor, as that of cabbage or dandelions, it is far better to blanch the products by means of steam, as there is then no loss of food value. This process is necessary to remove objectionable acids and bitter flavors, to reduce the bulk of vegetables like spinach, and to obviate all necessity for the old-time intermittent process by which the fruit or vegetables were boiled in the jars for three days in succession to insure the destruction of all germ life.

ONE OF THE JULY POSTERS USED IN CONNECTION WITH CAMPAIGN

e. *Sterilizing* or *Processing.* — These terms are used interchangeably, and refer to the steaming or boiling of the filled jars for the purpose of destroying all spores, germs and bacteria. Needless to say this is the most important part of the process, for if sterilization or cooking is not complete the canned goods will not keep.

III. In the meantime the asparagus should be started. Explain the process and terms as you work; then immediately prepare the pineapple. Put the jars on to boil together, taking out the pineapple as soon as it is finished, and allowing the asparagus to boil 60 minutes, as directed in the recipe.

IV. The general method of procedure is the same for vegetables or fruit. The steps are as follows:

1. Scald or blanch the food according to the length of time noted on the timetable.
2. Dip in cold water.
3. Remove the skins if necessary,

remove any cores, blossom ends, stems or stone, according to the nature of the food which is to be canned.

4. Pack into wide-mouthed jars as closely as possible.

5. Fill the jars almost full with the desired liquid, and add salt according to directions, if needed.

6. Adjust the rubbers and tops and partially clamp them on. If Mason jars are used screw the tops down until they touch the rubber, but do not absolutely close the jars, as the expanded air cannot escape, and will cause them to crack.

7. Sterilize the required length of time in water to cover the jars fully an inch.

ANOTHER OF THE IMPRESSIVE POSTERS NOW READY

8. Remove the jars, tighten the covers, and turn the jars upside down on a cloth away from a draft. Cover them with a cloth so that a sudden breeze will not cause them to crack. This is the test for leakage.

9. A second test is as follows: After a few days loosen the clamps and pick up the jars by the covers. If sterilization has been complete the covers will not come off as a complete vacuum will be formed. Clamp again and put the jars away, after wrapping them in paper or cloths, to assist in preserving the color.

V. In the meantime the strawberry preserve should be baking; talk about the advantages of the oven in this regard; and when done the oven should be cooled to about 120 deg. Fahr., so that the peas may be put in. For the drying of the peas use one of the new wire screens made to fit gas ovens, but tell the class that improvised screen trays may be made of galvanized wire screening which may be fastened on the oven racks. Show how four or five screen trays may be put into the oven at one time, and put one or two on top of the oven on racks which will raise them two or three inches. In other words, show how a great deal of evaporization may be done with the expenditure of a small amount of gas. Products evaporate down to one-tenth their usual bulk—that is, 10 pounds of peas will make a pound of evaporated peas.

VI. Show how the evaporated products should be stored in paper bags, the necks twisted and the whole painted over with melted paraffine; say that they should be looked over occasionally, and if any insect life has developed, they should be spread out in the sun. When the insects have disappeared the fruit or vegetables should be heated to 160 deg. Fahr., then resealed in the bags and reparaffined.

VII. In the meantime remove the jar of pineapple from the boiler and test it for leakage. Seal the strawberry preserve, as directed in the recipe.

VIII. If possible, speak about the new pressure cookers and have one to show. Explain that it is not necessary to use the cooker to get good results in canning; that an ordinary wash boiler, or any other deep, tightly covered utensil will do quite as well.

IX. Emphasize the fact that the rubbers must be new, and *all* rubber—not a substitute. The jars must be free from nicks around the edges and from cracks and the covers must fit. Absolutely *no* preservatives, or preserving powders should ever be used. They are prohibited by law in many states.

X. If it is customary to serve food to the class let them taste the strawberry preserve, and any vegetables canned at the previous lesson.

XI. While this is going on, explain to them that the peas may be used in the winter as fresh peas, by soaking them for a few hours. After cooking, they may be creamed, used in a salad, a soup, or in any other way. Suggest delicious combinations for sandwiches in which the strawberry preserve may be used. Take out the asparagus, seal and test for leakage.

XII. Answer questions.

NOTE.—The whole point in canning by the cold-pack method whereby the jars are fully immersed in the boiling water is complete sterilization. (Some authorities now hold that the water should come up to the rim of the jars, and this brings about as good results. However, we are now following absolutely the Government methods.) The work must be careful and accurate. There is opportunity for a very attractive and helpful lecture demonstration.

Keep in touch with the topics of the day through the newspapers, the *Literary Digest*, the editorials of the *Saturday Evening Post*, *Pictorial Review*, *Ladies' Home Journal*, *Good Housekeeping*, etc., and get the news on conservation.

If there is a blackboard, place on it the quotation given on the month's folder. Keep your eyes open for new quotations along this line—they are to be found every day in the magazines and newspapers. It is only by keeping abreast of the times and up-to-date that you are going to be able to communicate enthusiasm, and foster in your classes the determination of the women to make extra efforts to can and preserve the nation's food.

TO THE LECTURER OR DEMONSTRATOR

The following information from the Department of Agriculture is distributed free of charge on application and may be found helpful in connection with the general subject of canning.

Weekly News Letter:

Food Thrift Series.
No. 2. Watch your kitchen waste.
No. 3. Let nothing spoil.

States Relations Service:

Form NR. 21. Methods and devices in home canning.
NR. 25. Home canning instructions.
NR. 29. Common home canning difficulties.

It is suggested that arrangements be made to have a cooking instructor illustrate the canning, preserving and drying of various fruits and vegetables, in season, as outlined by Mrs. Allen in the National Commercial Gas Association *Bulletin* for June, 1917. This demonstration should cover details of methods, costs, suggestions for the forming of canning clubs and data on the varieties of foods that can be preserved.

Rate Increase at Crisfield, Md.

Owing to the increased cost in gas oil and gas coal, the Crisfield Light & Power Company, Inc., has been forced to increase its price of gas 30 per cent. According to R. G. Anklam, superintendent, the company has taken this step with considerable regret, as they realize the check which this increased price must necessarily put upon new business.

This city has also the disadvantage to contend with in the fact that many of the old consumers are moving from that city to sections where munition works and Government contracts draw them. We understand that out of a community of 5,000 inhabitants, about 300 families have already removed.

Louisville Secures Cantonment

Official notification has been received that Louisville, Ky., has been selected as one of the sixteen sites for a new United States Army cantonment.

Work on the site will be started immediately. Preparations are being made to house 35,000 soldiers, who will be encamped about September 1.

This means an almost immediate increase in the population of Louisville of 35,000 and a $1,000,000 monthly payroll.

The site selected lies about six miles from the center of Louisville in the vicinity of Audubon Park. It consists of two thousand acres, one thousand of which will be used for maneuvering grounds.

The Louisville Gas & Electric Company will extend its electric and gas service to the camp without charge and furnish these utilities at rates now given the city.

Corporation Changes in New Mexico

The Albuquerque Gas & Electric Company has been incorporated under the laws of New Mexico and has acquired all the properties, franchises, etc., of the Albuquerque Gas, Electric Light & Power Company and the Albuquerque Electric Power Company and will continue all the business previously carried on by the two latter companies in the city of Albuquerque, N. M. All the capital stock of the new company has been acquired by the Federal Light & Traction Company.

Public Service Commission Has Not Power to Authorize Increase Beyond Legislature Rate is Ruling in Brooklyn Case

That the Public Service Commission has not yet been empowered by the Legislature of New York to authorize a gas or electrical corporation to increase its rates beyond a statutory rate fixed by the Legislature, even though changed conditions show that the legislative rate has become unremunerative to the company, is the ruling of Ex-United States Supreme Court Justice Charles E. Hughes as referee in an action brought by the Brooklyn Borough Gas Company to restrain the commission, the Attorney General and other public authorities from enforcing the application to the Brooklyn Borough Gas Company of the 80-cent gas rate passed by the Legislature in 1916.

Hearings upon the injunction application of the company have been in progress before Ex-Justice Hughes by consent of the parties during the week and will be continued in the office of the referee, No. 96 Broadway.

The plaintiff company asked for a decree annulling and declaring to be confiscatory not only the 80-cent gas law but also the 95-cent gas rate prescribed by an order of the commission in 1913 and the dollar gas rate enacted by the Legislature in 1906.

The company operates in the Thirty-first Ward of the Borough of Brooklyn, which is the Coney Island and Sheepshead Bay region, in which the summer business is much larger than the winter use of gas.

Sioux City to Make New Lighting Contract

Councilman Rudolph Beerend, under whose department the street lighting is regulated, announced recently that the city would enter into a new lighting contract with the Sioux City Gas & Electric Company as soon as L. L. Kellogg, manager of the light company, returns to the city. At present Mr. Kellogg is under the care of physicians at Rochester, Minn., but is expected to return home next week.

Councilman Beerend asserted that he would recommend to the council that the 25 per cent reduction offered by the light company be accepted. The finance head asserts this reduction would enable the city to reduce its light bill $9,000 a year and should be accepted.

He asserted that the contract will date back to May 15, when the city amended the gas ordinance, striking out the candle power regulations. The agreement proposed by the light company was that the candle power regulations must be eliminated before the city receive the reduction in its light rate.

Some of the council members, led by the mayor, have expressed the view that the city should wait until next spring before renewing the contract. They believe that by waiting conditions might right themselves, which probably would mean a bigger reduction.

Councilman Ward had advocated that the city make its own power for street lighting and there is a possibility that this plan will be given some consideration before the new contract is signed.

Fair Reports Notwithstanding Increased Costs

Reports of the artificial gas subsidiaries of Cities Service Company for the month of April are in many instances very gratifying, even though the increased coal cost has cut into net profits. Largest in the percentage of increase is the Lebanon Gas and Fuel Company, Lebanon, Pa., the sales of which were double those of April, 1916. Correspondingly, the business of the Knoxville Gas Company, Knoxville, Tenn., increased 40 per cent; of the Salina Light, Power and Gas Company, Salina, Kan., 30 per cent; of the Bristol Gas and Electric Company, Bristol, Va.-Tenn., 20 per cent, and of the Pueblo Gas and Fuel Company and Toledo Railways and Light Company, 10 per cent.

Gas Main Under Missouri River Washed Away

V. L. Elbert, general manager of the St. Joseph (Mo.) Gas Company, received notice recently that one of the natural gas mains leading across the Missouri River at Weston had been carried out by the swift current.

It was said that the only other main might also go at any time.

Mr. Elbert at once began to get the local plant ready to manufacture gas, in order that consumers might not suffer.

Production Committee of Empire State Association Inspects Rochester's Plant

The gas manufacturing plant of the Rochester Railway & Light Company, now nearing completion in the river gorge, Rochester, N. Y., was regarded by 35 members of the Production Committee of the Empire State Gas & Electric Association as most complete. Both the old and new plants were inspected under the guidance of James T. Hutchings, general manager; Herman Russell, assistant general manager; Joseph P. Haftenkamp, superintendent of the gas manufacturing department, and William H. Earle, assistant superintendent.

Two meetings were held during the day of the meeting at the Hotel Seneca. The committee meets four or five times each year to keep every member in touch with the latest developments in manufactured gas production. George D. Conlee, of Amsterdam, presided.

10 Per Cent Rate of Return Urged by Washington (D. C.) Company Officials

Allowance of a 10 per cent rate of return on the fair value of the properties of the Washington (D. C.) and Georgetown Gas Light Companies was urged before the Public Utilities Commission recently by Howard S. Reeside, president of the Washington company, and Milton E. Ailes, vice-president of the Riggs National Bank. Joseph Leiter, former president of the Washington Gas Light Company, attended the hearing.

The commission's valuations, recently announced, are $9,097,873.31 for the Washington company and $829,886.59 for the Georgetown company. In response to a question by Commissioner Brownlow, Mr. Ailes expressed the opinion that the valuation work of the commission would tend to stabilize securities and make them be regarded more as an investment than a speculation. He was of the opinion that at least a 10 per cent rate of return would be required to maintain the present strength of the securities. Attorneys Ben S. Minor and J. J. Darlington appeared for the companies, while the witnesses were examined for the commission by General Counsel Syme.

Personal Notes

W. K. Eavenson has resigned his position of sales manager with the Surface Combustion Company, Long Island City, N. Y., to take a position with The Long-Landreth-Schneider Company, New Brunswick, N. J., manufacturers of the Kompak water heater. Mr. Eavenson was formerly with the Consolidated Gas Company of New York; Industrial Fuel Department.

Samuel J. Dill, president of the United Gas & Electric Engineering Corporation, died recently at his home, Oceanview Avenue and Alsop Street, Jamaica, L. I. He was a member of Greenwich Lodge F. and A. M.

M. A. Bowlin has resigned his position as sales manager of the Jacksonville (Fla.) Gas Company and gone to Macon, Ga., where he will assume charge of the Macon gas and electric utilities. Mr. Bowlin, who is one of the most popular young business men in Jacksonville, was recently elected a director of the Jacksonville Advertisers' Club and is an active Rotarian. He was also elected secretary and treasurer of the Southern Gas Association at the recent convention. A. H. Rumbold, sales manager for the Tampa (Fla.) Gas Company, will succeed Mr. Bowlin.

Construction Notes

New Holder for Pennsylvania Company

The Lansford Gas Company is erecting a new holder with a capacity of 100,000 cu. ft. Increased consumption of gas in the Panther Valley necessitated the action.

New Bedford Company Buys Land for Future Expansion

The old "Candlehouse lot," on the northeast corner of School and Pleasant Streets, New Bedford, Mass., has been sold to the New Bedford Gas & Edison Light Company by Haskins & Gibson for the estate of Horatio and Francis Hathaway. The lot contains 31¼ rods of land with two two-family houses. The house on the corner is numbered 452 Pleasant and 99 School Street and the one northeast is 95-97 School Street.

The property has belonged to the Hathaway family for a great many years. On old maps is seen a long low building, a candler's shop, which gave its name to the site. The present buildings were erected there by Mr. Haskins and his father.

The gas company buys the property to hold for future expansion. It now owns more than half the land in the block bounded by Pleasant, Spring, Purchase and School Streets.

14 More Gas Lamps for New Haven

Mayor Campner has signed an order passed by the board of aldermen a week ago granting permission to the New Haven (Conn.) Gas Light Company to erect 14 ornamental gas lamps in Crown Street, between Church and Orange, and from four to six similar lamps in Little Orange Street, between Crown and George. The lights will be of the "White Way" style and will make Crown Street and Little Orange a veritable White Way, according to the gas company's proposed plans. They will be erected and maintained at the expense of the gas company.

Start to Rebuild Newton, Ia., Gas Plant

Building of foundations for the new machinery at the gas plant has begun. The insurance adjusters finished their work sufficiently to allow work to be commenced. The rebuilding of the plant and replacing of the machinery will be pushed, but it will be some time before users of gas may expect to be able to start their stoves.

City May Offer to Buy Mains of Hamilton Company

Legislation was passed by council some time ago for the laying of gas mains in certain streets. At the present time and for some time to come the service department will be unable to secure the necessary pipe to satisfy new patrons. Under these circumstances a proposition is up for consideration by means of which an offer will be made to the Hamilton (Ohio) Utilities Company for leasing or buying the mains in such streets in which the city intends to lay gas mains. Whether the project will go through is to be learned after an offer has been made to the Hamilton Utilities Company.